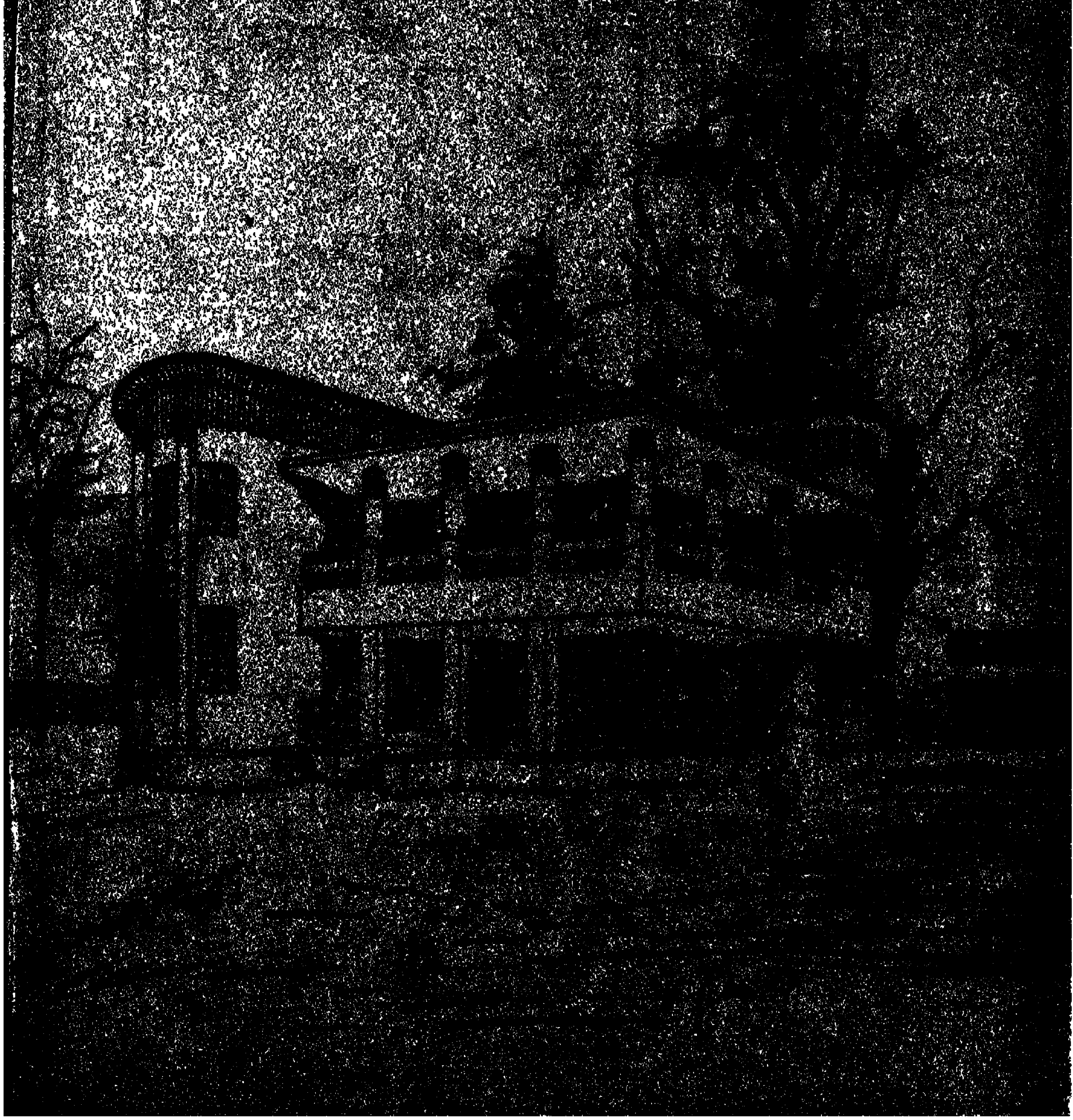
The House

ITS PLAN AND USE

TESSIE AGAN M. S.



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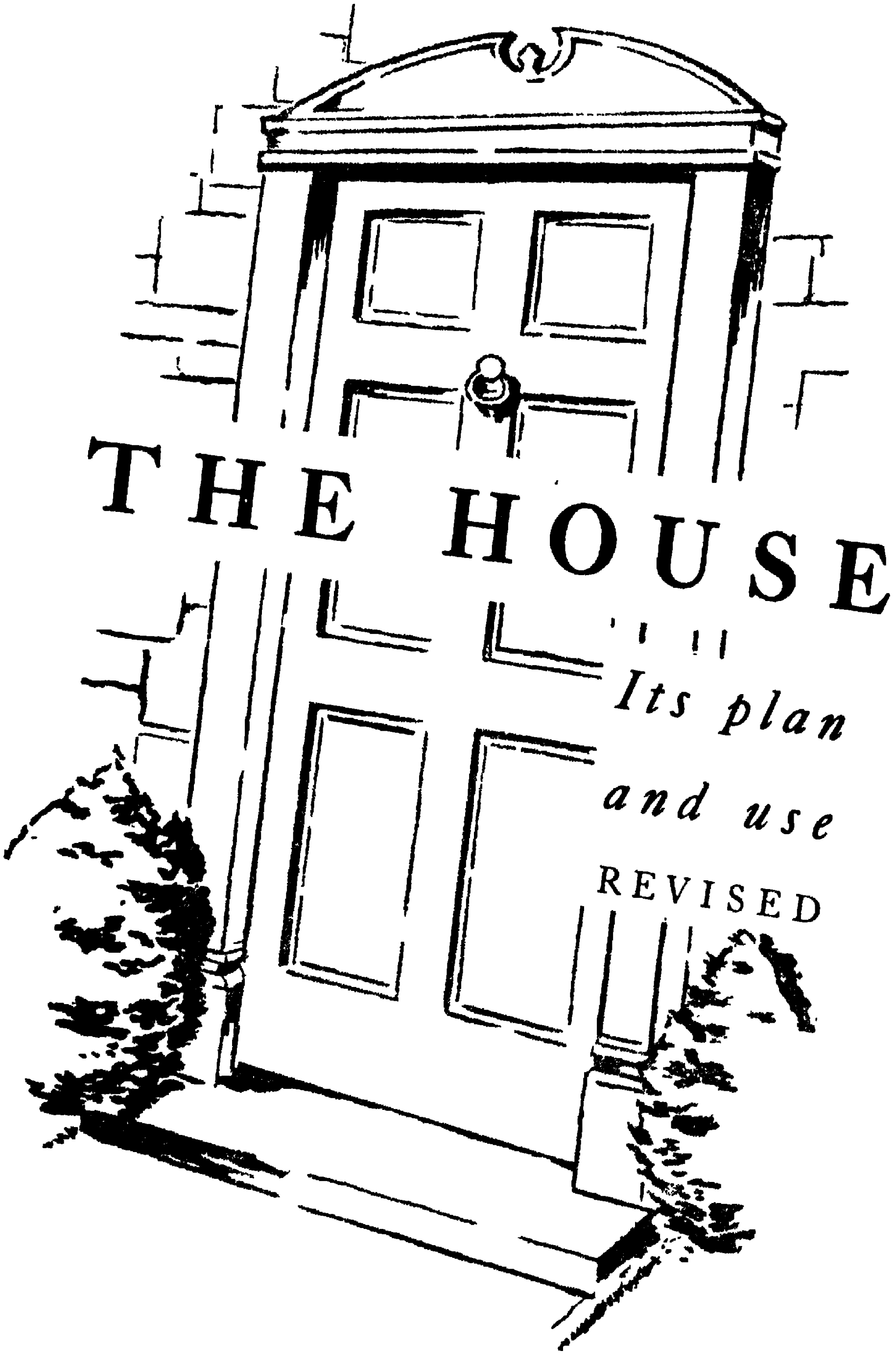

THE HOUSE

Its plan and use

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PREFACE

The first edition of this book, published in 1939, brought together facts considered pertinent in the understanding of the part which housing and its management plays in satisfactory family living.

The second edition, published in 1948, took cognizance of an expanding concept and development in the field of housing. As a consequence, the subject matter was reorganized and enlarged.

Like the earlier editions, this, the third, presents material concerning problems of housing the family suited to instruction at the undergraduate college level. An attempt is made to make tables and other subject matter relate to the 1950 decade. The objectives continue to be as follows:

1. To develop an understanding of housing as it affects family well-being and social relationships.
2. To explore standards of housing which provide adequately for privacy, rest, comfort, health, order, work, and wholesome social relations.
3. To foster a critical interest in the pros and cons of home ownership and to study means by which it is accomplished.
4. To evaluate household equipment in terms of standards desirable for its choice.
5. To help apply this knowledge and these understandings to the solution of problems typical of those met in everyday living.

In a text dealing with so broad a field, it is necessary to draw freely on many sources. Numerous references throughout the book acknowledge this assistance. To these and to all others who offered suggestions, criticisms, and other help in the preparation of this and earlier editions, the author acknowledges her great indebtedness and her deep appreciation.

TESSIE AGAN

CONTENTS

UNIT ONE. The Modern Family and Its Housing Needs

1. How Does Housing Affect Family Life? 7
2. What Family Activities Should Be Provided for in the Design of the House? 13
3. How Can the House Meet the Requirements of the Family? 24
4. How Is the Health of the Family Affected by the House? 61
5. How Can the Safety of the Family Be Preserved in the House in Which It Lives? 82
6. What Provision Shall Be Made in the House for the Family with Children? 99
7. What Provision Shall Be Made in the House for the Aged? 118

UNIT TWO. The House and Its Environment

1. In What Kinds of Houses Do People Live? 125
2. How Does Community Development Affect the Desirability of the Home Location? 144
3. How Shall the Exterior Design of the House Be Chosen? 161
4. How Can an Attractive Setting Be Attained for the House? 180
5. What Are the Characteristics of a Good Rural Home? 190
6. What Are the Characteristics of a Desirable City Apartment? 206

UNIT THREE. Meeting Housing Needs on the Family Income

1. How Much Shall the Family Spend for Shelter? 218
2. Shall the Family Own or Rent Its Home? 227
3. What Legal Information Should a Homeowner Have? 234
4. What Amount Can Safely Be Spent for Home Ownership? 251
5. What Financing Agencies May the Prospective Home Buyer Use? 266
6. How Shall the Cost of Building a Home Be Estimated? 273
7. By What Standards Is the Structure of the House Judged? 286
8. What Has Been the Role of the Government in Housing? 301

UNIT FOUR. Providing Efficient Work Centers and Adequate Storage Space

1. In What Productive Activities Do Present-Day American Households Engage? 316
2. What Are the Requirements of an Efficient Work Center? 326
3. What Special Consideration Shall Be Given to the Planning of an Efficient Kitchen? 347
4. How Can an Efficient Laundry and Work Area Be Planned? 365
5. What Provisions May Be Made for Sewing and Mending? 381
6. What Constitutes Adequate and Desirable Storage Space for a Home? 387

7. What Small Equipment Is Necessary for Food Preparation? 410

UNIT FIVE. The House: Its Fundamental Equipment

1. What Wall, Floor, and Work Surface Finishes Are Satisfactory for the House? 437
2. What Constitutes Adequate Plumbing Equipment? 455
3. What Equipment for Air Conditioning May Be Chosen for Heating, Cooling, and Ventilating the House? 472
4. How May Adequate Illumination Be Chosen for the House? 486
5. What Constitutes Adequate and Convenient Electric Wiring for a Home? 513

UNIT SIX. Choosing Equipment Which Uses Electricity and Gas

1. What Standards of Construction and Use Are Desirable for Portable Electrical Cooking Appliances? 537
2. By What Standards May Ranges Be Chosen? 549
3. How May the Refrigeration Needs of the Household Be Met? 571
4. How May Desirable Cleaning Procedures Be Established? 587
5. What Are Important Considerations in the Choice of Equipment for the Washing of Clothes? 604
6. By What Standards Shall Irons and Ironers Be Chosen? 615

UNIT SEVEN. Standards of Quality for Certain Home Furnishings

1. What Should Be Considered in Choosing Dinnerware and Glassware? 630
2. By What Standards Shall Silverware Be Chosen? 649
3. How May Suitable and Satisfying Furniture Be Chosen? 658
4. What Should Be Considered in the Wise Choice of Floor Coverings? 680

APPENDIX 693

INDEX 697

THE HOUSE

Its Plan and Use

• UNIT ONE

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The Modern Family and Its Housing Needs

IF WE are to determine the housing needs of the present-day American family we need to know what constitutes a family and what the family is like. For our purposes a family will be regarded as a group of persons related by blood, marriage or adoption, residing together in a dwelling, sharing a common table, and receiving its support from, a common purse. Common understanding of such a group is a family of husband, wife, and children living at home. Other related or unrelated persons may live with the family. Currently these may be a married son or daughter with or without spouse, and with or without children, an elderly couple or person, or a few related or unrelated roomers or boarders. These are often referred to as subfamilies.

Broadly, family groups are known as households. Unrelated groups living together are also known as households, but not all households are families. For example, a few members of the same sex who live together and share a common table constitute a household, but not a family. A large unrelated group, such as an orphanage, residents of a college fraternity, boarding houses, occupants of an institution and others are classed as quasi-households. Suitable dwellings for all of these must be supplied.

Scrutiny of the families of any community will reveal wide differences in composition among the related groups living together, as in the number of persons in the group, the age dispersion, and the nature of the membership that individuals hold in the group. Here, in a small apartment, are a bride and groom who later welcome the arrival of their first child. Nearby, the house resounds to the activities of children of several ages. There, gay adolescents fill the house. Next to them live a "fiftyish" couple, leaders in the community. And some place in the neighborhood may be a household of young career girls tucked into an apartment on the second floor. Down the street, in careful tidiness, are an elderly couple to whom, on occasion, come grown children. grandchildren and great-grandchildren—home, from near or far away, for a visit.

Each family is at a stage in the normal cycle of family life. The family begins at marriage, and changes in its composition and needs with the coming of infants, their growth into the preschool, elementary school, and adolescent ages. Then come the maturity and departure of the children usually followed by several years of comparatively vigorous life before old age begins or one dies.

The age at which these phases are apt to occur has changed somewhat during 60 years and especially during the last 20 of those years as is shown in the table on page 5.

The size of the family has changed somewhat from earlier times. In 1850 the median size was 5.6; in 1950 it was 3.5. The number of children in homes with children rises until it reaches two or three by the time the husband is 35 to 44 years of age and then declines.

MEDIAN AGE OF HUSBAND AND WIFE AT SELECTED STAGES OF THE LIFE CYCLE OF THE FAMILY, FOR THE UNITED STATES: 1950, 1940, AND 1890[1]

Stage of the Life Cycle of the Family	Median Age of Husband			Median Age of Wife		
	1950	1940	1890	1950	1940	1890
A. First marriage	22.8	24.3	26.1	20.1	21.5	22.0
B. Birth of last child	28.8	29.9	36.0	26.1	27.1	31.9
C. Marriage of last child	50.3	52.8	59.4	47.6	50.0	55.3
D. Death of one spouse (a)	64.1	63.6	57.4	61.4	60.9	53.3
E. Death of other spouse (b)	71.6	69.7	66.4	77.2	73.5	67.7

a. Husband and wife survive jointly from marriage to specified age.
b. Husband (wife) survives separately from marriage to specified age.

There are seldom any additional relatives living with the couple while the husband is under 40 years of age. From that time until old age approaches there may be one or more other adult relatives (usually grown children) in about half of the homes and one or more other young relatives (usually grandchildren) in about one out of 10 homes. Frequently older dependents are added when the wife is 45 years or older.

The income generally varies with each of the stages of the life cycle. The highest income level of an individual in the family is achieved between the ages of 35 to 54 depending on the income bracket. Low income persons level off sooner than those with higher incomes. For most people income begins to decline around the age of 50. Peak family expenses come during the high school and college years of the children.

Although the income is relatively low for newly married couples, within 10 years it generally has increased about one-third. When the family income is at its peak it may be as much as 40 per cent above the level of newly formed families. After the family head has passed age 65, the family usually has about half the income it had at its peak. The median income, 1952, was about $3,900. At this date, one-third of the families had two earners—usually the husband and wife. In one-tenth of the families there were three or more earners, usually including the wife and young adult children.

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[1] Glick, Paul C., "The Life Cycle of the Family." *Marriage and Family Living*, February, 1955, page 4.

Although it is a typical pattern for husbands to work from marriage to the age of retirement, at no time do more than half of the wives work away from home. The largest group of women wage-earners were in the 18–24 age group, with the 25–34 age group running a close second. There is a trend toward using older women in the labor force. During the first year after marriage about 40 per cent of the wives have jobs away from home. During the second and third years the proportion of working wives drops to 30 per cent. For the period when women have children of preschool age, only about 15 per cent are in the labor force. After all the children have reached school age, nearly one-third of the wives are employed.[1]

The housing needs of a given family or household are determined by the stage it has reached in the cycle of its life, and the interests it has developed. The extent to which the needs are supplied is determined partially by the family's understanding of, and its ability to obtain the needed facilities. Each family attempts to meet its housing needs through the selection of a dwelling unit, its choice being determined by many factors. By definition, "a dwelling unit is a group of rooms or a single room, occupied or intended for occupancy as separate living quarters, by a family or other group of persons living together or by a person living alone." [2] The variety of living quarters included under the term "dwelling unit" is extensive. Thus a dwelling unit may be a detached house; a tenement, flat, or apartment in a larger building, such as an apartment house, an apartment hotel, or a section of a hotel devoted entirely to apartment rather than transient use; or a room in a structure primarily devoted to business or other nonresidential purposes. It may be a superintendent's living quarters in a public building, such as a courthouse or library; a watchman's living quarters in a factory, store, or warehouse; a chauffeur's living quarters in a garage; or a tourist cabin, trailer, railroad car, boat, tent, and others if occupied by persons having no other place of residence. When counting the rooms in a dwelling unit, bathrooms, closets, pantries, halls, screened porches, and unfinished rooms in the basement or attic are not counted.

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[1] Ibid, pp. 7–9.

[2] Census of Housing: 1950. Vol. I, General Characteristics, Part 1 United States Summary, p. XVI. United States Government Printing Office, Washington: 1953.

Problem 1. HOW DOES HOUSING AFFECT FAMILY LIFE?

We know that the services which family members might expect of their group life are listed as economic, protective, religious, educative, social, affectional, and status-giving. The economic and protective functions of family life are obvious to any adult. Through group life the available economic resources are utilized to provide daily necessities and possibly some luxuries for the family members. The money income is used to this end. Productive activities carried on in the home may supplement the money income, and such labor may multiply many times the value of a commodity as purchased and hence represent a real contribution to the family income. The direction of the household as a consumption group is also important in the economic life of the family. For example, if the amount spent for housing were allocated to each member of the family for separate use as rent, it might not be enough to provide each individual with a room—not even a hall bedroom! However, the shared occupancy of a home by a number of family members allows each member the use of several rooms. Numerous other examples of the economic advantages accruing to the family as an economic unit may come to mind.

The protective services of the family are most needed at the two ends of life's span. The helpless infant and the helpless old person alike make demands for care and protection that, though commonplace, are far more exacting than is sometimes realized. The school child's needs for protection, although sometimes ignored, are great and specific. The family members who are ill must be cared for, and those who are crippled or incapacitated must be ministered to.

These services are only part of the story. We all need protection from sun and rain, heat and cold; our health must be protected and our well-being safeguarded during the hours of work, rest, and relaxation that we spend in the home. Detailed discussion of these points will be presented in the succeeding problems. Here we will give consideration to the effect of housing on the social, affectional, and status-giving services and satisfactions of family life.

It is commonly accepted that the family or home life of an individual affords him quite different satisfactions from those gained or sought in his activities in the business, professional, or political world. Hocking classes the two as the private order and the public order, respectively.[1] The private order, comprised of the family and the recreational and social activities centered about family life, has for its concern the satisfaction of the whole man by satisfying his need for social life, his desires for love and affection. He says:

> Thus the private order is adapted to save much that is lost in the public order. As the self of immediate expression can reveal more than is seen in the self of marketable technical expression, love does not make its judgments or choices primarily from what it finds in the sphere of work; it looks to the self of play or art, of bodily beauty, of manner and carriage, emotion, aspiration, religious feeling. . . . What the family grasps and uses of that self is its total achievement, not the method and articulation of his work.[2]

The public order lies in the world of work and endeavor outside the home. Hocking points out that what the individual may experience here can be summed up in the exercise of his marketable talents. The statement is made, "The marketable man is never the complete man in his uniqueness; and conversely the whole man is never marketable." [3] The importance of the home, of family life, is stressed in the statement that the success of any man's service in the public order depends upon a state of mind which the private order—the family life—keeps alive.

The concern of every family should be that the deeper satisfactions of life be afforded its members in the interplay of personalities incident to family life, that its members be enriched for participation in both the world of work, the public order, and the world of affection, the private order. Cognizance should also be given of the need of its members for growth beyond their present status; growth of body, mind, and soul. With this preliminary discussion of the importance of family life to the individual and to society at large, we come to the question, how may housing affect family life?

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[1] W. E. Hocking, *Human Nature and Its Remaking,* pp. 304–306. Yale University Press, New Haven, 1929.

[2] *Ibid.,* pp. 306, 307.

[3] *Ibid.,* pp. 305, 306.

Housing may affect the social and affectional aspects of family life by influencing directly the reactions of the members of the group. The response of an individual may be limited or heightened depending on the provision made in his home for rest, and the privacy or quiet that gives sense of peace and inner strength. For centuries privacy was the privilege of the religious devotee who sought freedom from the press of worldly things that he might become more "otherworldly." Thus lords and ladies began to desire privacy for the greater enjoyment of this world, and the organization of castles into series of private rooms, each with its own function, took place. It was in the seventeenth century that privacy became the new luxury of the well-to-do. In the twentieth century it has become a recognized need, if not a possession, of the humblest worker. Today, when congestion characterizes the housing facilities of most cities and some villages, when rapid transportation and radio lead to numerous contacts, sometimes not of a character sustaining to the ideas and ideals of the family, the very pressure of the numerous stimuli of our fast-moving and complex world makes provision for privacy of prime importance in housing plans.

Housing may affect family life by the provisions it makes or does not make for those persons not of the immediate group, as aged aunts or grandparents, who are included in the family although not an immediate part of it. Unless the house is so planned that the apartness of such persons is recognized, there will be a marked complication of group life. Satisfying family life is frequently frustrated by the constant presence in the family circle of an irritable and dominating grandparent, whose emotional whims and demands for attention are exerted to keep him the center of the stage. Likewise, many older people find their lives unmeaningful when the living conditions of the family group of which they are a tolerated, but not an integral, part make no provision for their unique interests.

The house should also facilitate self-expression and a degree of freedom of action on the part of the individual family members. Bored, listless persons cannot contribute to a significant "private order" nor can they be said to be growing. Houses that have attics or basements where the creative efforts of family members may be undertaken without affecting the serenity of the lives of others; houses that afford space for the storage of collections of stones, birds' eggs, and stamps; and houses that provide for workshops and playrooms, are serving the families not only by affording shelter, but also by giving an adequate background for desirable activities by members of the group.

Housing may affect family life either favorably or adversely, depending on the provisions it makes for the routine activities of the household. Mothers are often so weary that they are unable to contribute to the social life of the family because of the heavy toll exacted of them by houses, large in size and with scattered and unorganized work centers. For example, houses with butler's pantries when there is neither butler nor even a part-time household helper, may necessitate daily much extra walking on the part of the homemaker. It is likewise true that if too small a space is given to the work area of the home, the family members may be effectively barred from participation in the work. The tiny kitchenette where there is space for only one worker does not permit the introduction of the child to the work of the home, nor foster pleasant working companionship with the mother or older sister.

Houses constructed on various ground levels, approved by artists for their interest and charm, may be found by the homemaker to be both hazardous and wearisome places if such levels occur in the line of traffic between parts of the work area and the social rooms. The failure to provide for all productive activities which are followed in the house, such as sewing or laundering, and for extra income-producing activities such as care of dairy or poultry products, leads to crowding and disorder.

The provisions made for social life are also important. In colonial days, and in the later days of the pioneers, the large kitchen served for the family gathering. Today, the living room has replaced both the gloomy parlor of yore and the spacious living-room kitchen, and serves the average modern family as a place where friends are received and group life is shared. A house with a living room large enough to provide for the social activities of the family, and so located as to permit privacy from the outside world, has a contribution to make to the social life of the family. If there are other rooms which can also be so used, the tensions arising in the family with teen-age or young adult children are more easily controlled. In like manner, companionship within the family may either be limited or fostered through the provisions made for shared group experiences. Hours spent as a family group about the flicker and flare of a fireplace, at a mutually enjoyed game, or at the long cherished pastime of reading, aloud or alone, do much to build a sense of oneness into a family group. Companionship with the rest of the family of those who must do the work of the house is increased if work areas are not so segregated or so small that conversation cannot be carried on while work is in progress.

The house and its surroundings are status-defining for the family. One has only to see some of the pretentious houses that are built for the seasonal housing of a wealthy family to realize that in some cases the house is planned not so much for what it may contribute to the private order of life of those residing in it, but perhaps largely for what it may say concerning the success or effectiveness of the family members in the public order. Social prestige from this source may be sought as an expression of business or professional success. A house with "a hundred bedrooms and sixty baths" may announce to the world something of the financial status of its owner, but it does not signify that he is successful in the private order, nor that the structure contributes to the depth of the affectional life of the family. The status-defining aspect of housing affects families who live in six-room bungalows as well as those who live in baronial castles. The location of a home "on the wrong side of the tracks," in a small world sure of its social geography, may lead to discriminations that are as senseless as they are real and that are sometimes almost disastrous to individual family members.

Emphasis on the material aspects of housing fostered by our material civilization may so bewilder family members that they may be unable to find those significant values of the private order which they should seek. Not infrequently some one person in the family becomes so concerned with the maintenance of perfectly finished floors, or the elegance of silken upholstery in pastel colors, or becomes so enthusiastic about antique furniture as to lose sight of the home as a place where life is being lived at the present time. If the material things deter rather than facilitate joyous living by all members of the group, ownership of them is a liability rather than an asset.

Thus it seems that housing may affect family life as it provides adequately or inadequately for the private order, which includes the whole of family life and the recreational and social activities centered about family life. Housing should provide for rest and quiet, relaxation and a sense of peace, opportunity for self-expression and freedom of action, the routine activities of the home, and companionship in the home. It should provide for satisfying social contact between members of the family and the world outside. The house should remain important as background; it should not become a fetish that hampers rather than contributes to the life of the group.

Suggested Activities

1. Make a list of services that a family member may expect to receive because he is a member of the group. Choosing one of the services cited, explain the effect on the family member if he is frustrated in his expectancy of this service.

2. List several activities of a home which require a special housing provision.
3. Describe a situation in which housing seems to have had a deleterious effect on family life, analyzing the situation in regard to origin, expression, and probable effects.
4. Describe a situation in which housing seems to have had a sustaining and helpful effect on group life.
5. Outline a plan for checking the effect of housing on family life that might be used on a group of twenty-five families in the geographic section with which you are most familiar.
6. Choose a family that you know. How many aged or infirm members outside the immediate family live with them? How long have these persons shared the home? How much household help has been employed within the year? Does this family have adequate and satisfactory housing facilities for the inclusion of these additional members?

References

Bernard, Jessie, *American Family Behavior*. New York: Harper and Brothers, 1942.

Hocking, W. E., *Human Nature and Its Remaking*. New Haven: Yale University Press, 1929.

Problem 2. WHAT FAMILY ACTIVITIES SHOULD BE PROVIDED FOR IN THE DESIGN OF THE HOUSE?

The design of the house in terms of the social functions for which it serves as a background is still on a prescientific basis. The adaptation of houses to the needs of human beings has not been studied as carefully as the adaptation of factory buildings to the needs of particular industries, or of barns and stables to the needs of various animals. Definite knowledge of the habits of different families and their satisfactions and difficulties in adjusting to various types of houses or apartments would help us determine the characteristics of adequate house design.

The design of every house is an act of social importance. It influences the future trend of family living. By force of the environment it presses family life into one shape or another.

Certain functions are favored at the cost of others. At times some functions are eliminated from the home in order to serve more urgent needs.

The planning and choosing of a dwelling has long followed the old method of building a menu, basing choices on custom and personal likes and dislikes. Today, although these factors would not be disregarded in menu planning, selection from the "Basic Seven" is urged to insure a reasonably balanced meal. This simplified rule has evolved through a long period of research on the basic dietary needs of the individual. Adjustments are recognized as necessary for persons as their needs vary from babyhood to adult years. A similar shift is desirable in the planning of houses. The place to begin is, not with the house itself, but with the needs of the persons who are to occupy it.

Because of the multiplicity of its functions, the fixity of its location and its bulk, the family dwelling is an exceedingly complex structure. The house, whatever form it takes, is the center of family life. It must provide space for group and individual activities of the family, such as recreation, reading, shared experience and affectional life among family members, and the reception of visitors. It must afford facilities for the withdrawal of individuals for study, rest, or thinking during periods of family member activity; for sleeping, with its related functions of storage of clothing and personal effects. It must make easy such activities as food preparation, the serving of meals, dishwashing, laundering, and house cleaning, with the related needs for the storage of supplies and equipment and the disposal of wastes. It must make available space for children's play and for adult or adolescent hobbies; for the overnight accommodation of relatives or other guests; for personal hygiene, including the special needs of infants and others having special requirements. It must provide for the storage of miscellaneous household goods such as playthings, luggage, game and sports equipment. Not less important are the provisions for ease of traffic within the house and from within to without or vice versa.

The house should be so arranged as to facilitate these essential activities, foster harmonious family life, and minister to the privacy and integrity of the individuals living in it. The house should create an atmosphere of comfort and quiet, be fresh and cheerful, spacious with ample grounds. Yet withal, it should not be too large nor complex for the scale of living of its occupants. The criterion for judging the adequacy of the house is whether in each case the planning and organization of space is such as to serve the functions of family life and the needs of each individual within the home, and provide an opportunity for gracious and unhampered living. Truly, the modern dwelling is as intricate in its type and layout as the functions it serves.

How then is a plan achieved? To create such a plan, the functions of family life are considered without relation to any type of housing unit. The functions of family life in a house are expressed in a list of the activities which the family performs therein. Such a list might be something as follows:

Relaxation and leisure-time living:
  resting
  talking
  visiting with guests
  dancing
  reading
  lounging and smoking
  keeping records
  doing needlework
  thinking
  listening to the radio or record player
  enjoying pets
  displaying articles of interest
  writing letters
  playing games
  showing films

Entertainment:
  informal—having committee meetings
  formal—family

Play of children:
  very young—yelling, creeping, learning habits
  young—running, yelling, playing with pull toys
  school age—fighting, projects left undisturbed indefinitely, having shows
  adolescents—instrument playing, using the telephone, dancing, being secretive, convening of the gang
  supervised play

Studying

Eating:

- pickup meals
- quick breakfasts
- snacks
- family meals
- dress-up meals
- dinner parties
- party refreshments
- large luncheons
- holiday and other celebrations

Preparing food:

- planning
- storing
- preparing food
- washing dishes
- waste disposal
- preserving food

Laundering, cleaning, and other maintenance:

- storing clean and soiled linens
- sorting
- washing
- drying
- ironing
- using cleaning tools and supplies
- repairing house and equipment
- making the family clothes

Sleeping:

- napping
- night's rest
- caring for sick
- dressing
- undressing
- reading in bed

Bathing and grooming:

- cleaning teeth
- washing face and hands
- bathing
- shaving
- putting on and removing make-up
- caring for hair
- sun and heat bathing
- treating accidents

Pursuing hobbies:

- inactive—collecting
  - arts and crafts
  - camera
- active—billiards
  - ping-pong
  - gardening
  - sports

Storing:
  facilities adjacent to the place of the activities of the family for the equipment and supplies needed for these activities, as well as separate storage for the many articles not in active use
Circulation:
  coming in from outside and going out from inside
  preventing unexpected or unwanted guests from prying into the family activities
  going from one part of the house to another
  going from place to place within a room

Obviously such a list as the above is general and incomplete. To make one specific for any family, its activities should be examined minutely and a pattern developed along its unique lines.

The next step in the planning process is to study the activities listed with the following questions in mind:

1. Which of the different functions require privacy or separation from others because of the nature of the activity or because of noise?
2. Which of the functions can take place in the same space unit at the same time without serious interference and mutual irritation?
3. Which of the functions can take place in the same space unit but not at the same time?
4. Which of the functions require special equipment or space which unfits it for other functions?

Separation of the activities of the family along these lines might fall into some such pattern as the following:

Activities requiring privacy for one or more members:
  resting
  talking between certain members
  visiting with certain guests
  reading
  thinking
  studying
  writing letters, keeping records
  displaying articles of interest
  using the telephone

being secretive
sleeping
dressing
most phases of bathing and grooming
lounging or smoking

Activities requiring separation from other phases of family life because of noise:
dancing
listening to radio or record player
yelling, running, fighting, play of children of all ages
active hobbies
using the telephone
playing certain games
having shows
practicing on musical instruments
the work of the home

Activities taking place at the same time in the same space:
talking with family members
visiting with guests
displaying articles of interest
smoking
playing certain games
doing needlework
serving refreshments
listening to the radio or other music

Activities for which scheduling of certain spaces may be required:
showing films
formal entertaining
having committee meetings
holiday and other celebrations
snacks
dress-up meals
practicing on musical instruments
dancing
caring for the sick
napping
pursuing certain hobbies
smoking

Activities which require special installed equipment (usually accompanied by some noise):

storing food
preparing food
washing dishes
disposing of waste
preserving food
storing clean and soiled linens
sorting clothes
washing clothes
drying clothes
ironing clothes
repairing house and equipment and following some hobbies
most of the activities connected with grooming

The number and the ages of the persons in the family, their interests and way of conducting their affairs all contribute to differences in the activities in which the members wish to engage. When activities are grouped into those that seem to belong together, and those that seem markedly different, we can visualize the kind of space necessary for each category and the possibilities of relationship among the spaces. We need to know then what kind of space is needed and what placement is desirable. Such consideration of activities soon results in concern with the furnishings and equipment associated with them in specific rooms. At this point the house plan has begun. When the room plans have been developed on paper with the due regard for certain activities, shove them around until the most desirable relationship among them has been determined. Always there will be compromises to be made as the family rarely can have the desired view, exposure to the sunshine and wind, and the amount of space wanted in each of its rooms. Consideration must be given to the relative importance of various activities over others, and to the possibility of the elimination or combination of some features because of cost limitations. In these ways, the house reflects its actual functions rather than its owner's daydreams.

An analysis of the Kennedy family and its activities follows: Mr. Kennedy is 40 years of age and his wife is a few

CHART OF THE KENNEDY FAMILY

ACTIVITY	WHO NEEDS IT			HOW IT IS DONE
	Who	Alone	With others	
Relaxation and leisure-time living				
Resting, talking, games	Father Mother	Sometimes Sometimes	Sometimes Sometimes	The adults take a short rest while children nap.
Reading	Father Mother	Sometimes Sometimes	Sometimes Sometimes	They read many books and magazines. One or the other reads to Danny before he retires.
Lounging and smoking	Father		With others	Usually smokes his pipe just after dinner.
Keeping records	Mother	Alone	With others	Likes to use a desk in the living room when the children are asleep.
Doing needlework	Mother		With others	Sits to do mending or needlework with father after dinner as he smokes his pipe.
Thinking	Mother Father	Alone Alone		Done when the children are asleep.
Listening to the radio	Mother Father Danny		With others With others With others	Certain programs they hear together before bed time. She follows certain programs as she works in the kitchen.
Enjoying pets	Danny	Alone	With others	He has a dog which is his constant companion. The dog sleeps in a warm box in the garage.
Displaying articles of interest	Mother		With others	Has decided to put away her 2 pieces of Dresden figurines until the children are older.
	Father		With others	He has acquired several golf trophies, which he likes to display in a glass case.
Writing letters	Father Mother	Alone Alone		They use the desk in the living room.
Playing games	Father Mother Danny Cheryl		With others With others With others With others	Father and mother have another couple in for cards about once a month. Father has a play session with each of the children just before dinner.

Activity	Who Needs It			How It Is Done
	Who	Alone	With others	
Having committee meetings	Father Mother		With others With others	He likes to use the living room. She uses the dining room table for making the plans.
Having parties	Mother Father		With others With others	Not more than 12 at a time; usually play cards. Father sometimes likes to have men in for cards.
	Danny		With others	A birthday party for him.
Having dates	College girl		With others	May have the living room for one evening a week.
Play and care of children				
Learning habits	Cheryl Danny	Alone Alone		Toilet training has begun. She eats in her high chair before the others have their meal. Danny is being taught to care for his belongings.
Running, yelling, playing with pull toys	Danny	Alone	With others	Danny can make as much noise as he likes in the basement, and at certain times in his room. Plays a great deal outside with his dog.
	Cheryl	Alone	With others	Cheryl spends some time in kitchen with her mother.
Dressing, bathing	Danny Cheryl	Alone Alone		Danny has learned to put on most of his clothes. Likes to put his clothes on a hook in the bathroom when he retires. Cheryl has learned to like her bath in the family tub. Both children fascinated with floating toys in the tub.
Eating				
Family meals	All			Keep a good standard of serving, but are rather informal. College girl eats with family.

Activity	Who Needs It			How It Is Done
	Who	Alone	With others	
Dinner parties	All		With others	Have relatives in a few times a year.
Quick breakfasts	Father	Alone		Has to leave home often at an early hour. Gets his own.
Snacks	Father Danny	Alone Alone		Before retiring when Father returns from a trip. Danny likes to eat midmorning and afternoon.
Party refreshments	Parents Danny		With others With others	At their card games. Danny's birthday parties.
Preparing food				
Planning, storing, and preparing and cooking food.	Mother	Alone		Likes to cook.
Washing dishes, waste disposal	College girl	Alone		Does them after each meal.
Laundering, cleaning, and other maintenance				
Storing clean and soiled linens	Mother	Alone		Likes to arrange good storage near the place where used.
Sorting, washing	Mother	Alone		Likes to do it as near her kitchen as possible.
Drying	Mother	Alone		Likes to dry outside whenever possible.
Ironing	College girl	Alone		Does it on afternoons she has free from classes.
Using cleaning tools and supplies	Mother College girl		With others With others	Each has certain rooms for which they are responsible.
Sleeping				
Napping	Danny Cheryl	Alone Alone		Have regular hours.
Night's rest	All	Alone	With others	Have to have 3 bedrooms. Cheryl now shares parents' room. College girl studies in her room.

Activity	Who Needs It			How It Is Done
	Who	Alone	With others	
Caring for sick	Mother	Alone		Only have had slight illnesses.
Dressing and undressing	All	Alone	With others	Everyone dresses and undresses in their rooms except the children who leave their clothes in the bathroom after their nightly bath.
Bathing and grooming				
Cleaning teeth	All	Alone		A rack for the tooth brushes of each.
Washing face and hands	All	Alone	With others	Danny has a set of steps so he can reach the lavatory.
Shaving	Father	Alone		Wants to do it at the same time college girl wants to put on make-up.
Putting on and removing make-up.	Mother College girl	Alone Alone		Each likes to do it in the bathroom where the light is good.
Caring for hair	Mother College girl	Alone Alone	With others	Washes her own and the children's hair. College girl puts her hair up nightly.
Treating accidents	Mother	Alone	With others	Has a kit in bathroom.

years younger. They have two children, Danny who is five years old and Cheryl who is eight months old. Mr. Kennedy is a college professor who works closely with the extension division of the college. This requires that he attend some classes and he also makes frequent trips out of town. Mrs. Kennedy enjoys her children and does considerable club work for the church and other women's groups. The only help they have is from a college girl who lives in the home and works for her room and board.

When selecting a house the Kennedys might number the items in the "How It Is Done" column and place the numbers on a sketch of the proposed plan. If the space is sufficient and otherwise satisfactory for the desired activities, the plan will probably be all right for them.

If one cannot plan a house but must use one already built, an analysis of the activities of the family is also necessary. Then the space requirements and interrelationships deemed desirable would be determined. Then from the dwelling units available choice is made of the one most adapted to the family needs. If a house truly meets the needs of the family, it may become a sort of extension of the family personality.

Suggested Activities

1. Analyze the activities of your own or another family whose life you know well.
2. Separate the activities into the areas suggested in this problem.
3. Make each of the rooms a different color and arrange and rearrange them until you have the relationship you desire. Do you have a quiet area, a flexible area?
4. What compromises are required?

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Problem 3. HOW CAN THE HOUSE MEET THE REQUIREMENTS OF THE FAMILY?

A house or its equivalent affords or should afford the family shelter, comfort, convenience, privacy, rest, and quiet. It also furnishes an avenue for the expression of the love of beauty by the family members. In the choice of a house for the family home, each family wants the best it can get in terms of its own needs and its ability to pay.

Although comparatively few people have the privilege of planning and building a house, most if not all persons, at some time exercise a certain degree of choice in the kind of dwelling deemed desirable, including its interior plan and its location. Many forces, some of them beyond the control of the family, may make difficult the selection of a dwelling which meets fully the needs of the group. However, the needs of the group should ever be the major consideration in the choice of a house. The floor plan of the house should be such as to facilitate pleasant and efficient family living.

There is a tendency on the part of some people to judge the desirability of a house plan by the beauty in architectural composition expressed in the general contours and the details of the facades. Beauty in architectural composition is achieved by proportion and balance. The proportions of the broad low houses are generally recognized as more pleasing in proportion than are square or tall houses. The balance of a facade or exterior depends upon the arrangement of windows, doors, porches, steps, and chimneys. Dignity and reserve are expressed by the use of formal balance, and friendliness and hospitality through informal balance. Important as is beauty in the exterior design, judgments of desirability of a house as a home in which a given family shall live, work, and play, cannot be made on the same basis as might be used in evaluating an architectural design. Provision for living as shown in a floor plan of good design is of more importance than pleasing façades. Fortunately, conflict between the two is not necessary. A charming exterior may enclose a floor plan good in design and suited to family life. Ideally, the two should be developed together, and the character of the interior plan should be reflected in the particular architectural style chosen for the exterior design. Desirable characteristics in the house plan should be established in the light of the activities of the home and the interests and desires of the family members.

After determining family needs and desires, the next major consideration is how these may best be met. Wide information concerning the successful relation of the house to the family needs and also the relation of the house to its environment is essential to sound decisions. Included in such information is a mass of detail concerning building materials and methods of construction. Knowledge of building trends in the community and of real estate values is also essential.

The satisfaction of a family in its "home place" is conditioned to a great extent by the degree to which the decisions made reflect the desires of the whole family group and are reached only after thoughtful and wise study of the many factors involved.

In use, the house and its grounds divide themselves into areas in which certain activities are carried on. In a crowded house two or more processes may be served by the same space, but generally the areas are separated for both sanitary and aesthetic reasons. Various names are given to these areas, but the most commonly used are these: (1) social or public rooms, those in which the family gathers, and in which it meets the outside world; (2) service or work rooms, those in which household operations are carried on; and (3) rest or private rooms, those in which the family as a group or as individual members seek rest and privacy. Play or recreational areas may be regarded as separate or as a part of the social or public classification, depending upon the situation in any given house. Some families would have no use for such areas and in their houses would allot no space to such activities. Others that have limited space but follow recreational pursuits in their homes use the social or public rooms, while still others with ample space at their disposal devote special areas to it.

The table on page 27 shows the rooms which are found in these areas. Not many homes would have all of these rooms but if they are represented in any way this classification locates them as to function.

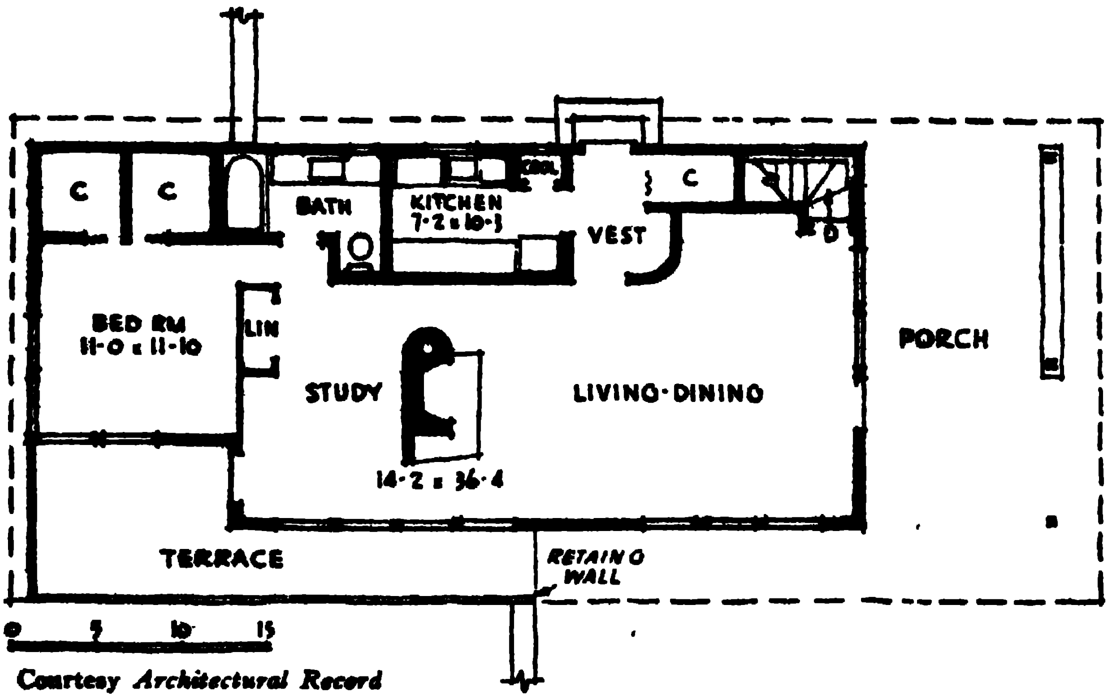
A trend in the methods of planning houses which should be mentioned is the so-called "open plan." In this plan, several rooms are combined within one space. In order to reduce the bulk of the building, living rooms, dining rooms, and dens

CLASSIFICATION OF ROOMS AND SPACES IN THE HOUSE AND ITS YARD ACCORDING TO ACTIVITY AREAS

Area of the House and Yard	Rooms or Spaces Included		
Social (or Public) and Recreation Area	Living room Parlor Entrance or reception hall Wrap closet Library	Dining room Den Study Music room Sun room Game or recreation room	Living-porch Terrace patio
Service or Work Area	Kitchen Laundry Breakfast nook Sewing room Service porch Work bench Service yard garbage and trash disposal drying yard delivery entrance garage and drive	Office Study or den used strictly for work	Storage space for: linens equipment extra food luggage fuel meters personal belongings sports goods heating unit space
Rest or Private Area	Bedrooms Hall Bathroom Closets Dressing room Sleeping porch	Private living room, den or study Sun porch for sun baths Nursery	

are fused by the elimination of the separating walls. In such a plan only the rooms used for daytime activities are usually combined. A trend toward the gradual inclusion of the kitchen also emerges. This combination is made possible by the availability of better equipment and the simplification of the processes involved in the preparation and serving of food and washing dishes. Small families or those desiring a casual life may find this arrangement interesting and satisfying. A growing family, however, will discover its limitations in providing privacy and quiet for its members.

People who are choosing a house which is already built should study until they can picture their family activities in it. Those who choose their house from a plan have a more

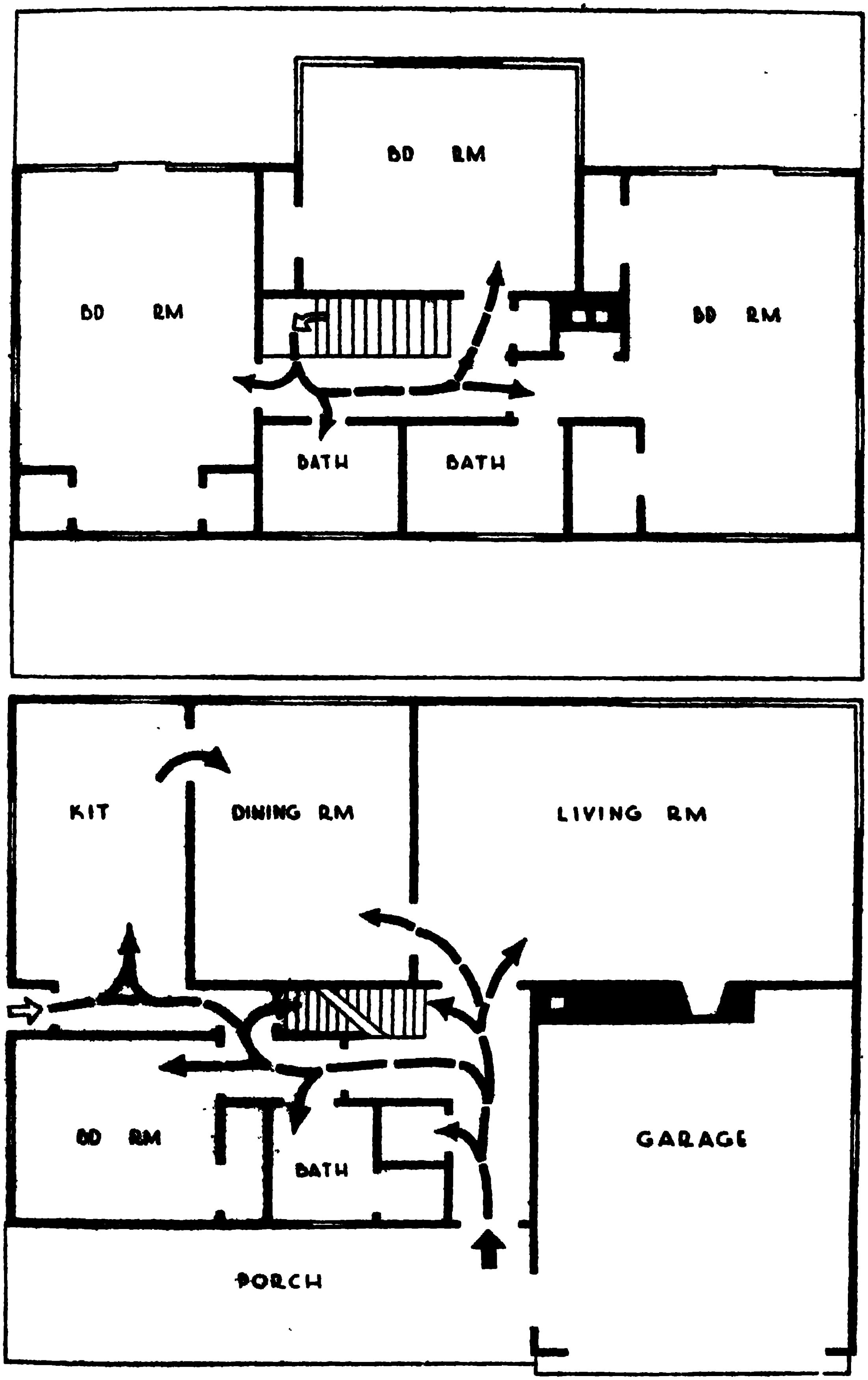


Courtesy *Architectural Record*

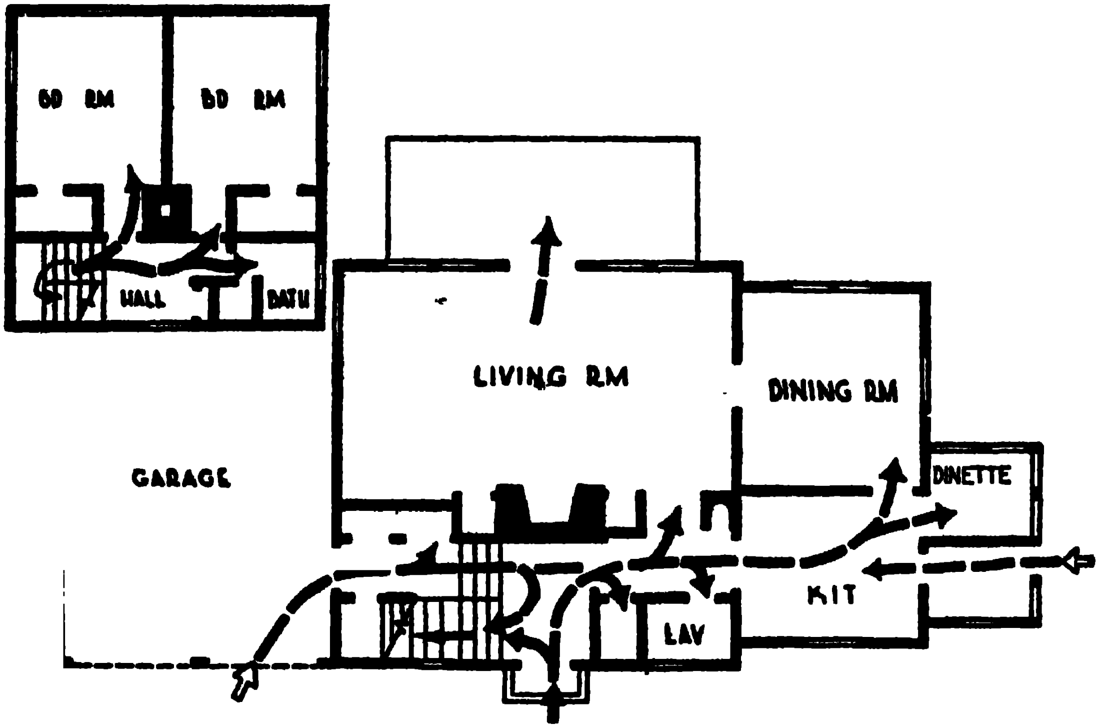
This plan shows a "one-room" house. It is divided only by a free-standing fireplace between living room and study, and by a linen closet between study and bedroom. Bathroom and kitchen are partitioned off, but the bathroom has the only interior door in the house. The result is a house complete in cooking, heating, and plumbing facilities yet simple in its plan and arrangement.

difficult undertaking. They must learn the symbols which are used to indicate all the walls, doors, windows, archways, fireplaces, stairways, porches, steps, and roof surfaces. In addition they need to know the indications for the location of telephones, electric lights, outlets, and switches. Study of the plan on this page will reveal the most important symbols used in house planning.

The house plan should afford admission to the house without bringing intrusion into the family life in any area. It should also afford full circulation within the house from area to area. The beginning of such an arrangement is usually made by providing a front entry hall, which is readily reached from the line of traffic, and is inviting and hospitable without being intimate. It affords a two-fold protection: the census taker or business caller is sheltered from rain, cold, and wind during the brief time necessary in the dispatch of his affairs,



In this two-story house the entrance hall permits direct access to all the rooms on both the first and second floors.



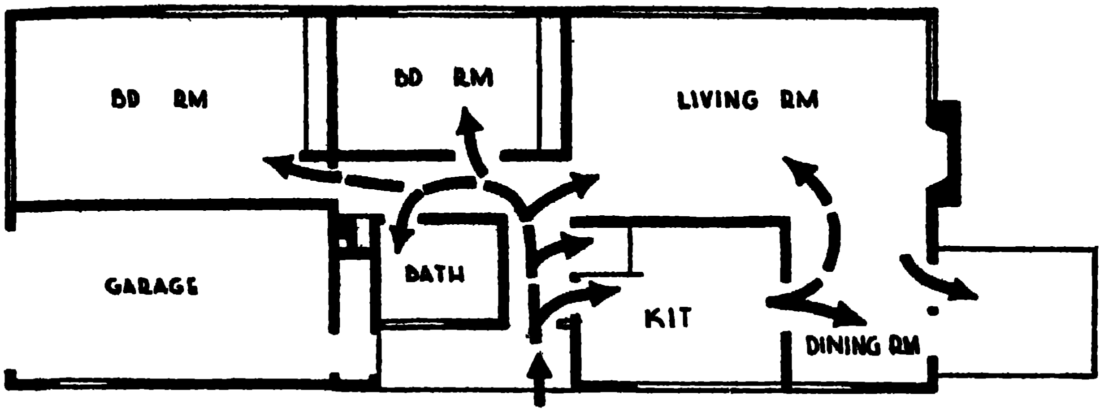
The hallways in this two-story house route all traffic at the front.

and the family is sheltered from the intrusion and violation of its privacy. It is easier to keep the temperature of the house at the desired point through the sheltering protection of the front entry hall. The entry hall should relate to the living room or rooms and should have ready access to the traffic routes that have been established to provide interrelation among the various areas of the house.

The provision made for traffic routes, or circulation from one room to another, differs in houses, but adequate provision is probably one of the most important factors in making the house useful. If one can go quickly and directly from one part to another without encountering too much family activity and too much furniture on the way, or if one can leave the house or enter it and get directly to the desired place, the traffic routes have been well planned.

The interrelationships among areas that must be established to insure the ease, efficiency, and satisfaction of living in a house are those necessary to permit such routine acts as:

1. Answering bell at the main entrance from the kitchen.
2. Going from the living room to the kitchen.

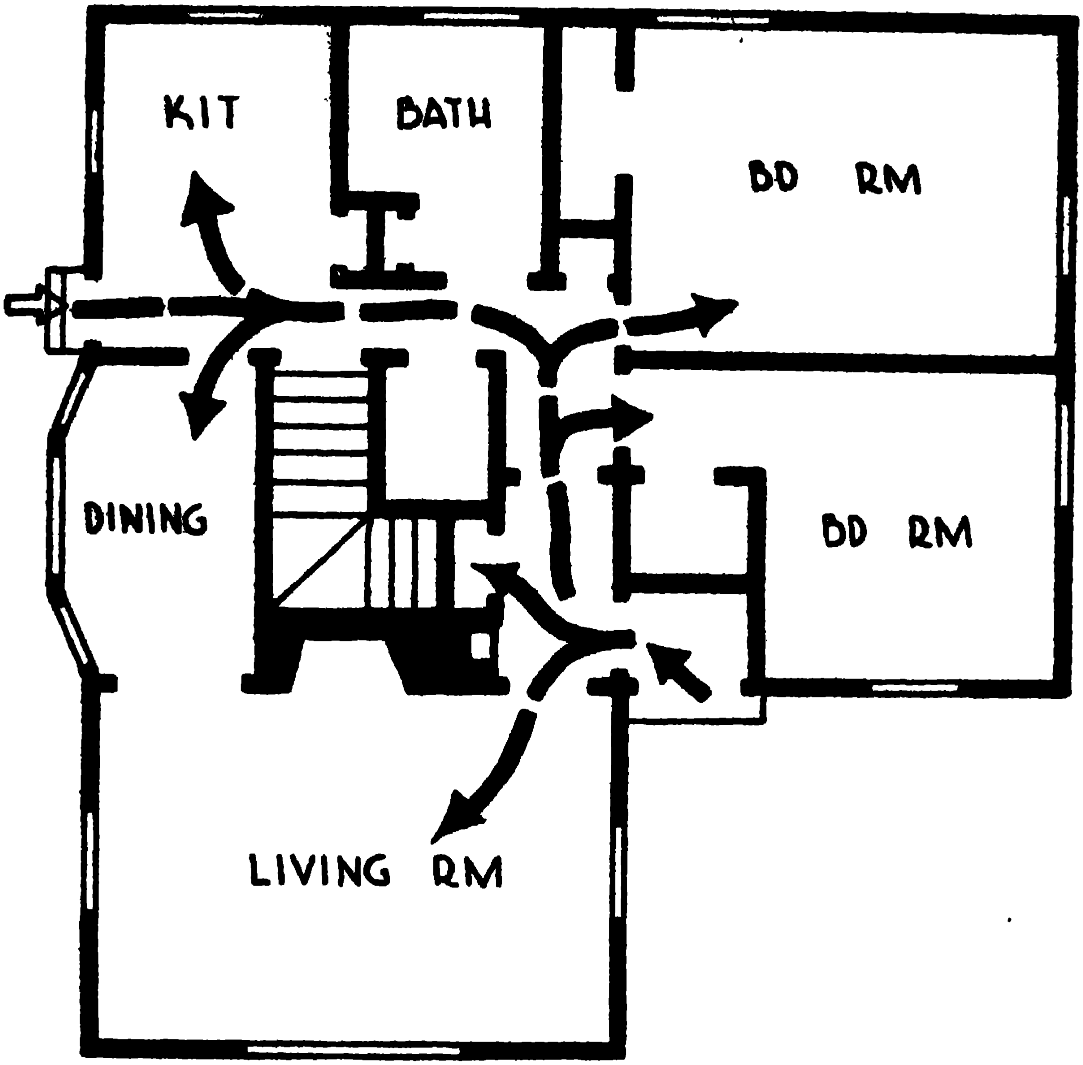


In this one-story house the central hall permits easy traffic routes to all rooms.

3. Going from the kitchen to other parts of the work area, as the laundry, the drying yard, the heating plant, the canned food storage, or the hobby center.
4. Carrying food to the dining table from the kitchen and returning with soiled dishes.
5. Carrying food from the kitchen to the porch for outdoor dining and returning with soiled dishes.
6. Reaching the second floor or bedrooms from various parts of the first floor and from the main entrance.
7. Going from a bedroom to a bathroom.
8. Going from outside to the bathroom, particularly common with children.
9. Going from an outside entrance to a coat closet.
10. Reaching the recreation area from the main entrance, living room, or bedrooms.
11. Reaching the kitchen, the living room, or the bedroom from the garage.

Traffic routes so placed that they facilitate these activities make for ease and efficiency and reduce to a minimum movement through areas not involved. Successful interpretation of good circulation will depend upon the answers to these questions:

1. Are the routes short and direct or lengthy and winding?
2. Do they pass through portions of rooms where a traffic route is not desired?
3. Do necessary furniture arrangements interfere with easy traffic routes?

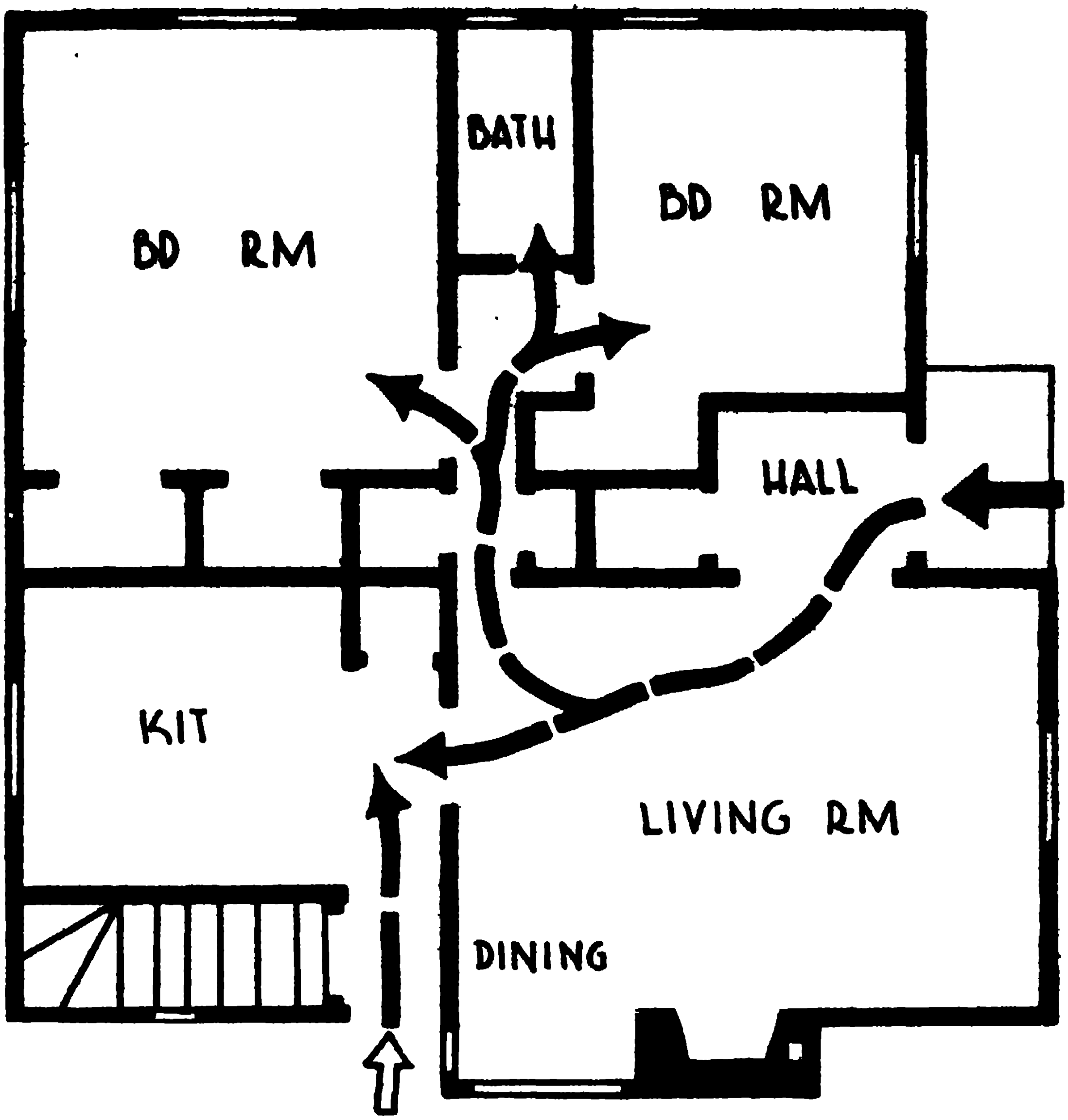


In this one-story house the small hall makes all rooms directly accessible from either door.

In studying any plan for the adequacy of circulation, dotted lines should be traced along the main traffic routes as shown on the plan on this page.

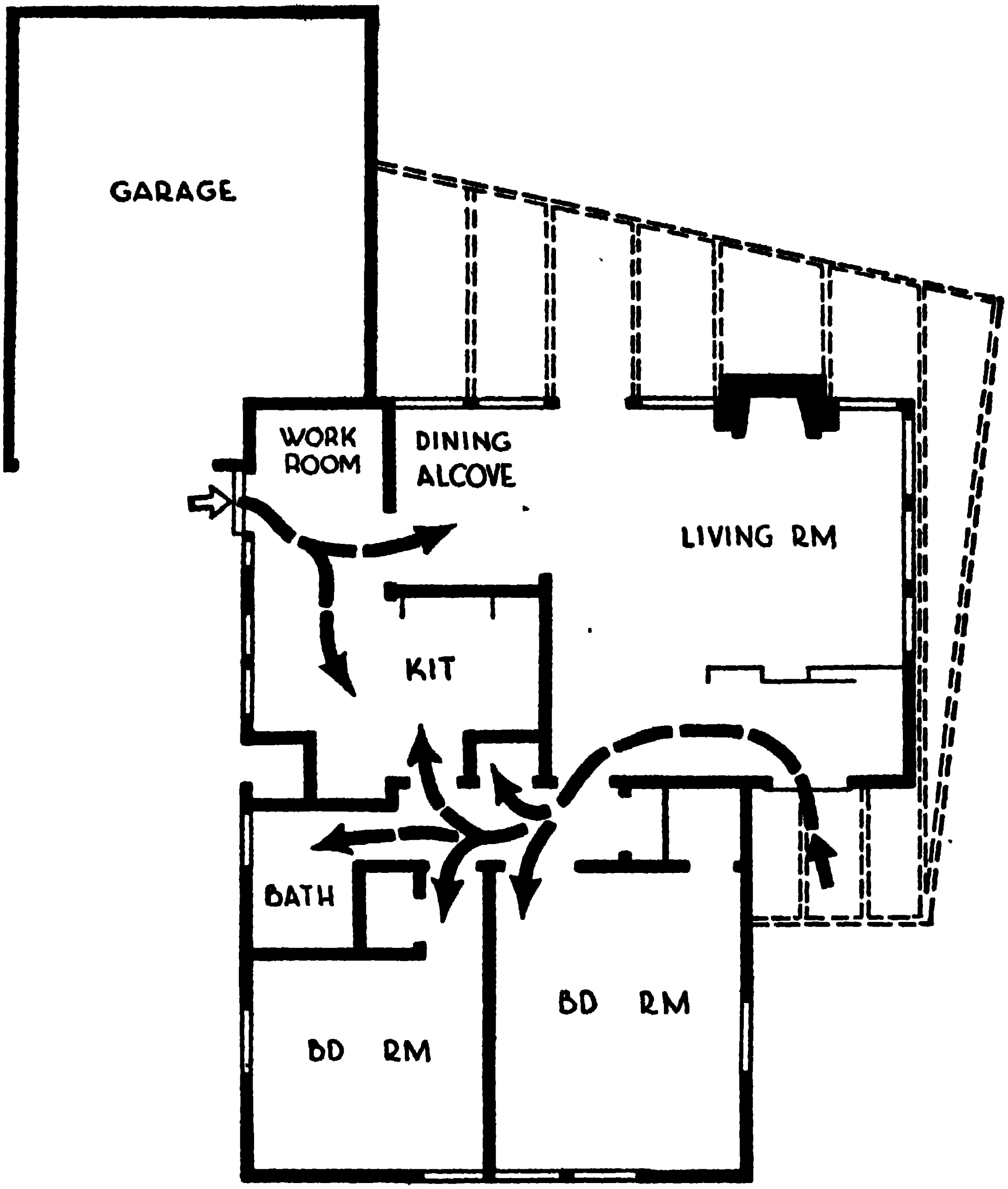
Good circulation may be accomplished by the following means:

1. Using an entrance hall as a hub, join it with other rooms either directly or through minor halls. In the city this hub may be toward the front of the house or side, if the family leaves from and returns to this door. But, if the family habitually leaves by car, a hall toward the garage is more satisfactory. In the rural house the hub is often best placed at the rear or side entrance.



In this one-story house with a small amount of space given to halls, there are traffic routes at one side and across one corner of the living room.

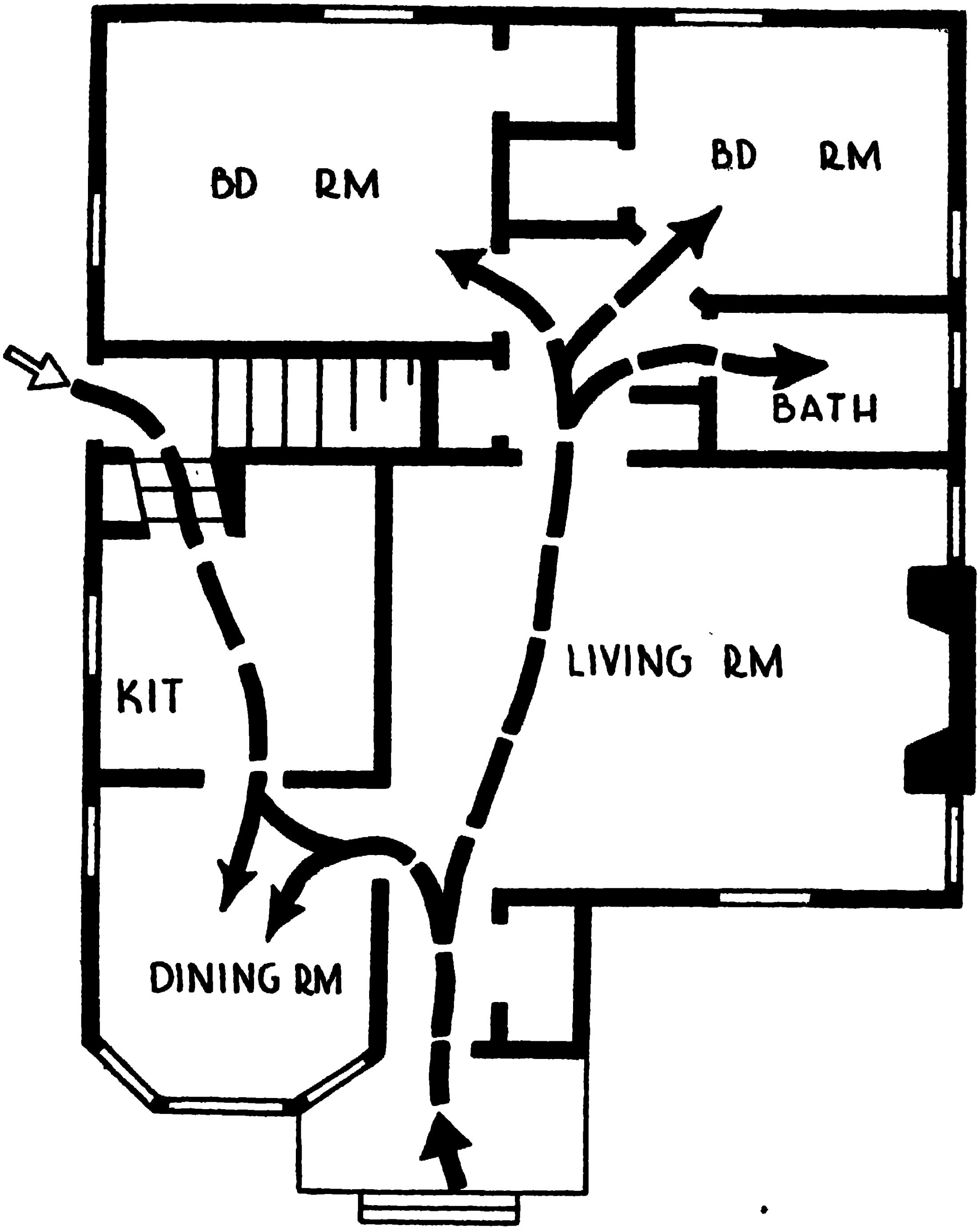
2. Locating the main entrance at the end of the living room with that part given over to a traffic route to kitchen, bedrooms, or bath may be satisfactory if space is not available for a hall.
3. Locating doors within the rooms so that access from one to the other and through other rooms may be obtained without going through the center of the room is a third possibility. Doors located near the corners of the room accomplish this purpose.
4. Arranging door swings so as to minimize interference with other doors or with furniture placements is important.



In this one-story house the main rooms are protected from the interference of traffic routes by a small hall and built-in cases in front of the entrance.

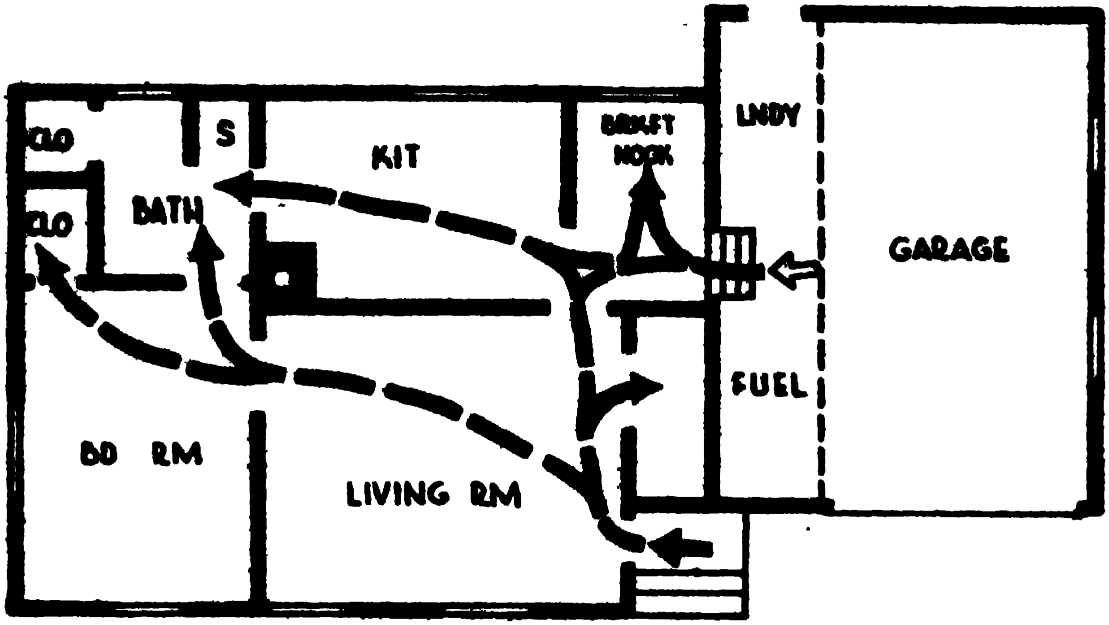
The space for living and leisure should be such as to permit satisfactory placement of the furnishings needed for the usual social activities of the family as a group and for the individual family members.

The function of the social area is to provide a place in which members of the family can gather to enjoy each other



In small houses without a central hall it is important to route any traffic through the living room to one end of it.

and in which contact can be made with those outside the family. The types of enjoyments followed here may take many forms depending on the habits of the people concerned and on the number included. The social activity may be only quiet conversation or it may be reading, listening to music,



Some houses are too small to permit hallways for traffic routes. Then it is important to locate doors so that paths do not take up all of the living space.

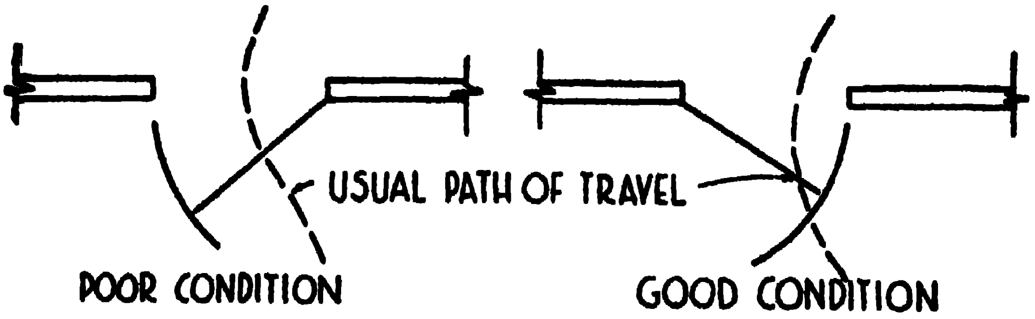
participating in games either quiet or active, or dancing. The family may engage in these amusements alone or others may be included. If the family varies as to ages, interests, and sexes, certain members may wish to carry on individual social interest simultaneously. In such cases, too much living in the living room may be the cause of friction among family members.

Provisions for these activities tend to create use-centers in which the social life of the family takes place. Father's chair with the reading lamp by it; the desk or table where a son or daughter may study, apart, yet included in the family group; the game table for the brief time of playing together before bedtime; all these and possibly other use-centers may need to be provided for without too much impact on each other. Further, the house plan should be such that none of these activities needs to be interrupted by the ordinary conduct of the affairs of the household or by the comings and goings of household members or others. The activities normally performed in the living room and appropriate furnishings for these include:

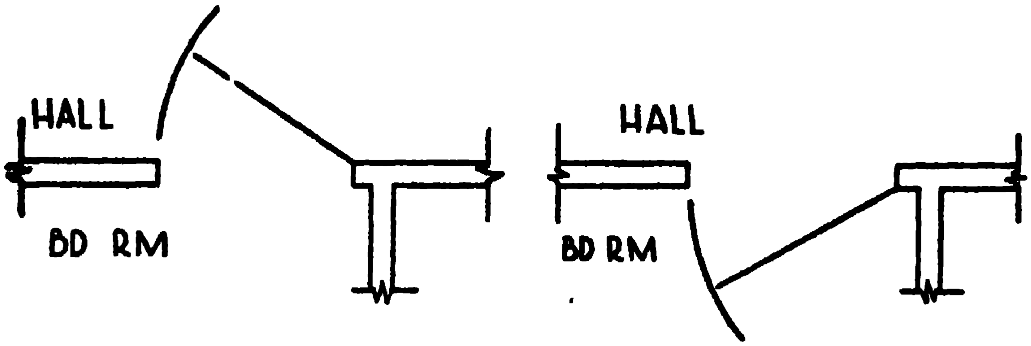
For conversation:
  chairs, sofas, and small tables
For reading:
  similar to furnishings for conversation with tables for books and magazines, and a reading lamp
For writing or study:
  desk, chair, bookcases, lamp, wastepaper basket
For entertaining, formal or informal:
  combinations of many of the above
For dancing:
  music and a clear floor space
For music:
  piano and bench, radio, phonograph, easy chairs, storage for records and sheet music
For games:
  tables and straight chairs, storage for games
For doing needlework:
  chair, table, lamp, holder for the handwork
For showing films:
  projector and screen, suitable chairs
For enjoying pets:
  equipment suitable for the pet

It is truly important that study be given to the placement of furniture so as to create use-centers. A sense of overcrowding may result even in a well-planned dwelling from inappropriate or badly placed furniture. Families moving from the place for which their furniture was selected may have difficulty in planning successful arrangement for a new and different home. Hence, flexibility of furniture groupings on the basis of use-centers is important. Some of the more modern plans provide adjustable partitions separating quiet-private and noisy-public activities when the area available is spacious.

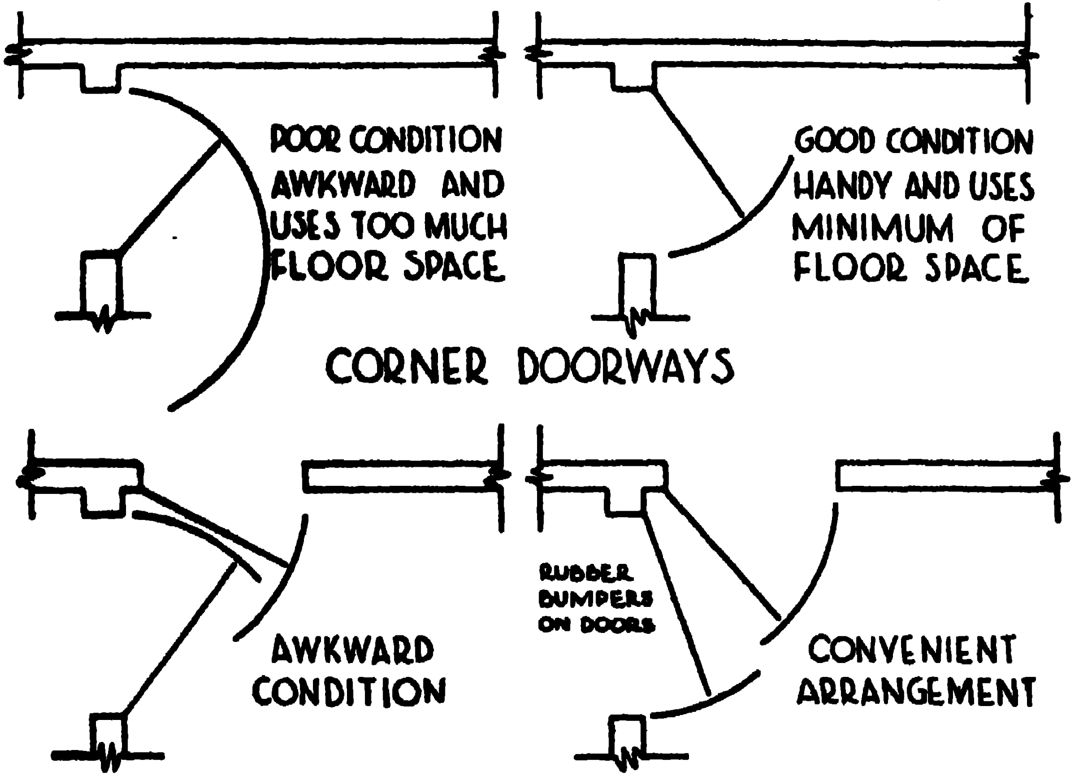
The social area should include some place other than the living room which can be used for the social purposes of individual family members. Sociability is one element in normal family life, and privacy is another which is psychologically quite as important. Opportunity for adolescent youth to meet persons of the opposite sex under wholesome conditions should be provided. To meet these needs a common living



POOR CONDITION GOOD CONDITION



DANGEROUS CONDITION SAFER CONDITION



These drawings show good and poor arrangements of doors.

room occupied by all members of the family and some place elsewhere for withdrawal during periods of entertainment seem essential.

The size and shape of the living room has a direct effect upon its usability for a family gathering place. Its short dimension should be no less than 10 feet 6 inches. A desirable size for a small house will usually approximate 13 feet by 18 feet, or one as small as 12 feet by 16 feet may suffice; for larger houses it may be upwards from 16 feet by 26 feet. If dining is combined with living, the area should be greater than for living alone.

In any room it is important that there be not only sufficient space of the proper shape for interesting and usable furniture arrangement but also that space be left for the necessary movement of persons within it. Common clearances recommended for this movement may be summarized as follows:

For passage:

Major traffic route	6 feet
Minor traffic route	4 feet
Between high furniture and wall	2 feet
Between two low pieces of furniture	1 foot, 9 inches

For sitting:

Space needed beyond front edge of straight chair for occupant's feet	1 foot, 9 inches
Space needed beyond front edge of lounge chair for occupant's feet extended	2 feet to 2 feet, 6 inches
Space needed between table, and wall, including chair	3 feet
Space between pieces of furniture in fireplace group facing each other	5 feet to 6 feet

The shape of the rooms bear directly on plans for furnishing. Oblong spaces are found most satisfactory for the rooms in the social areas. Even so, the elongated oblong, such as that of a living room 11 feet by 26 feet, presents one of the most difficult problems in room arrangement. The end spaces can be utilized but little, either for family activity or for decorative notes. One side of the room must be kept free for a "traffic route." This leaves only one side of the room to be used as the background for social and recreational activities. The unbalance in room arrangement that must attend such interior architecture is difficult "to live with," and should be avoided.

The square living room presents other difficulties in room arrangement. Too often in such rooms, the placement of doors is such as to throw the "traffic route" directly in front of the fireplace, cutting across any close intimacy that sharing the cheer of the crackling hearth may have fostered. Again, compensation in furnishings for any such defect in interior architecture is hard to make. Correct proportion and adequate size for rooms are not to be determined algebraically, but in terms of the requirements for family living.

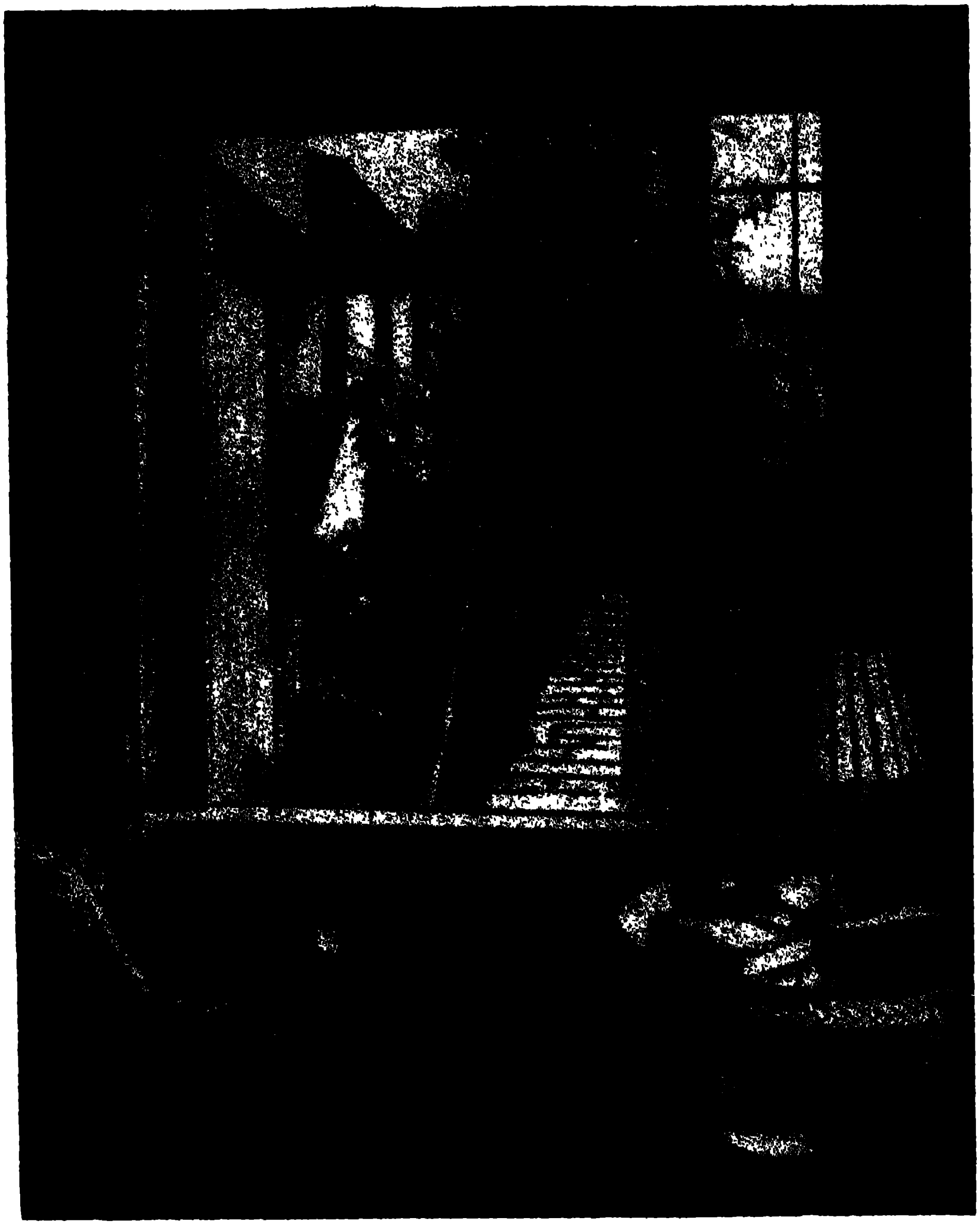
With the interest in modernistic houses, oblongs with rounded corners, or oval rooms, are gaining in interest and appreciation. Such an interior as usually finished obviously could not be successfully furnished with mid-Victorian walnut, nor yet with Colonial maple. It makes specific requirements for modern furniture. In general, irregular shapes and eccentric features are found to be liabilities in furnishing as they are in structure. Rooms should be simple in design, well proportioned with ceilings neither too high nor too low. Difficulties in decorating rooms with extremely high ceilings have been too frequently discussed to need further amplification. Usual ceiling heights are: 9 feet for large houses; 8 feet, 6 inches for medium-sized houses; and 8 feet for small houses, although 7 feet, 6 inches is sometimes used for these houses.

Next in importance to the size and shape of the rooms is the architectural design of the walls, including the area of the wall space and its finish. The statement is frequently made that "Two-thirds of the area of your home is wall space." Although one may never have made any computation as to the distribution of surface, the importance of wall area is evident to any observer. As important as the total area may be, the immediate concern of room furnishing is with the wall spaces

A beautiful window frames a beautiful view.

of a room as determined by such fixed features as windows, doors, built-in furniture, and woodwork. If the unbroken wall space includes most of the whole wall of a room, there is opportunity to add interest to it by such treatment as will give it a highly decorative note, by hanging pictures or fabrics upon it, or by placing wall furniture against it. If the unbroken wall area is small, such treatment will produce a sense of crowdedness, destructive to restfulness and peace. Some rooms have no wall spaces large enough to serve as backgrounds for pictures or furniture. In such cases, the interior architecture of the house is such as to prevent effective furnishing.

As the social area is the part of the house in which the cultural life of the family is developed and preserved, it should be a most pleasant place. The plan of the house should provide that the social area have an unobstructed outlook on the most pleasing view possible and that sunlight should flood this area giving warmth and cheer. There is an overwhelming national desire for more windows, bigger windows, and more interesting windows. In some cases windows may form an en-



Courtesy United States Advertising Corp.

Windows having attractive garden vistas are pleasant.

tire side of a room from floor to ceiling. Large glass areas are dramatic and presuppose an interesting view.

Windows as well as doors tend to establish the size and shape of wall spaces, and their position plays an important part in fundamental proportions. Their position should encourage rather than obstruct the natural grouping of furniture. If the wall space is so cut up with windows that the piano must jut out in front of one, and the desk must be placed in front of another, the room will not lend itself to satisfying use as the background. Windows may be vertical or horizontal in the wall, grouped or concentrated. They may be double hung, casement, or large panels. The position and kind of window has much to do with its treatment. If it is a large opening which dominates the room and presents an interesting view, furniture and other objects may be grouped about it to further emphasize it. The type, color, and pattern of its drapery may also contribute to its importance in the room.

A living room with several windows so placed as to provide both view and sunlight is highly desirable. Important as window space is, the room should not be made to suggest a goldfish bowl. A sense of repose is not readily conveyed in a room that has no pleasant modulation of light, nor other evidence of seclusion.

Certain considerations are important in making the living room contribute to the physical comfort of the family. In warm climates, shade from the sun's rays during the warmest part of the day is a necessary provision. Access to the prevailing breeze affords a welcome respite from extreme heat. The living room should by all means be dry and comfortably heated, and should have good circulation of air. Also, adequate facilities for artificial lighting, heating, and in some climates for cooling, are essential if the social area is to provide a background for comfortable living. Outdoor living areas are becoming more and more important in plans for family life. It is usually desirable to place such outdoor social areas away from the street to secure privacy. It should seem a continuation of the inside living area and should be as attractive and suited for social life as is the living room. The average climate has enough comfortable weather during the year to warrant the outlay this use of space requires. Many lawns are wasted because they are planned for display instead of for living. Control of insect pests doubtless will lead to increased interest in outdoor living area.

A family room with storage for games under the windows.

Provision for space for recreation has become common as informal entertaining has increased in popularity. When it became apparent that living rooms were not well adapted to the more active kinds of recreation, other areas were developed for this purpose. The game or recreation room, often occupying much of the basement, was developed first as a place where adults and children of all ages engaged in active games and enjoyed their own friends and family.

The family or activity room has had increasing popularity. It frequently adjoins or is a part of the kitchen area. It may include family meal service and laundry facilities, depending on the amount and organization of space in the house. Another location is in the bedroom area, providing a kind of large passageway to it. Regardless of its location its floors are usually wear resistant and easily cared for. Being located on the main floor, its inclusion in a small house may be at the expense of space in the living room and bedrooms. A fireplace here contributes to a cheerful atmosphere.

Provision of space for serving family and more formal meals is important, but the inclusion of a dining room as such is becoming less and less common in small houses. If it is to be used only for serving meals its cost, in comparison to similar dual or multiple purpose space as a part of another room, may be too great. For informal meals, in addition to the family or activity room, there is also the kitchen, the nook, the porch, the terrace, or the lawn near a barbecue. However, more formality and graciousness may be observed in a dining room, or a space in the living room at the end or side. Given free choice, the place chosen depends upon the occasion: a formal meal, a family meal, or a snack.

Maintenance of a separate room for dining provides a place for dignified dining and entertaining, and the "breaking of bread" becomes a matter of social significance. One or more meals shared by all the family members under conditions that contribute to social development build both the adequacy of the individual family members and the bonds that hold the members together. The dining room may be an implement of hospitality, making possible enriching contacts between the family group and other family groups, or individual members of other groups. Provision of it in the house plan tends to direct the social life of the family into the home rather than out and away from it.

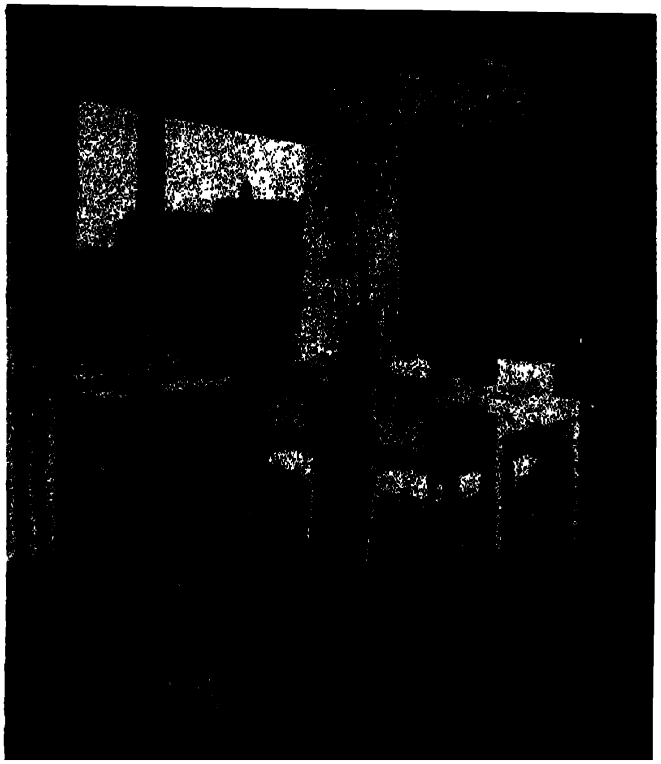
The present conception of a dining space off the living room is commonly the usual dining room without the separating wall. It is located at the end or at the side of the living room. Bays for this purpose are much liked, as their use makes the dining area interesting and important. The advantages are openness and possible extensions for entertaining. The disadvantages include not being able to close off the dining space and a cleaning problem resulting from always eating in the living room. In some of the more modern houses the wall between the living room and the dining room is adjustable, so that the space is flexible in its use.

For an informal family that is geared to an active pace, an area off the kitchen for everyday meals is efficient and in keeping with their way of living. In such case, there must be careful allowance for formal service and entertaining when the occasion demands. For this reason the kitchen nook is often in addition to other provisions for space for eating. The dinette separate from the kitchen or as a part of it adds much to the livability of a house. It reduces labor in connection with the preparation of meals and may be as gay and cheerful as it is desired to make it. It may have built-in shelves or window boxes or other decorative objects. Movable furniture is more easily cleaned and usually more comfortable than wholly stationary benches and tables. It is desirable to allow more than minimum dimensions for furniture clearances if space is not at too great a premium.

Dining rooms are somewhat standardized in size, are designed to hold the usual pieces of dining room furniture. The average size is approximately 12 feet by 15 feet with 13 feet by 16 feet being regarded as satisfactory for medium-sized houses. In small houses the space devoted to dining may be as little as eight feet by ten feet, but this is minimum and usually it is not a separate room but a bay or alcove off from the living room or kitchen. The size of the room should be sufficient to accommodate the furniture and allow passage around the room. Measurements usually include:

Distance between edge of table and back of occupied chair	1 foot, 6 inches
For comfortable passage	
Between chair and low furniture	1 foot, 6 inches
Between chair and high furniture or wall	2 feet
Between edges of dining room tables and major obstruction	3 feet to 3 feet, 6 inches

Many families prefer a formal arrangement of dining room furniture within the room, with the table in the center and other pieces arranged against the available wall spaces in as interesting manner as possible. One or more chairs may be at the table or arranged along the wall. Other families prefer the table to be ranged in front of a window or against an interesting wall space with other pieces arranged against remaining walls. If the door from the kitchen is located near a corner of the dining room, it will open back against a wall and leave larger wall spaces for important pieces of furniture, than if placed near the center of the wall. If the wall space adjacent to the kitchen provides placement for most of the dining room furniture and some storage, there are two or three wall spaces for books and writing supplies, a desk, a radio, or hobby display. The dining room then may serve in effect the functions of a second living room. In homes with small children it may justify its existence by becoming the playroom for a part of the day and a study at night.



Courtesy *Popular Home* and Hedrich-Blessing Studio

Furniture and the space in which to set it is adaptable to many different uses in this dining area.

When dining is carried on in the living room or an alcove opening from it, furniture harmonizing with that of the living room and arranged in an informal manner makes a pleasant transition. A screen or curtain may be arranged to hide the table from view of guests as it is being prepared or cleared.

Outdoor dining requires no particular type of equipment or arrangement. A pleasant climate and a porch, terrace, or greensward accessible to the kitchen and somewhat screened from the public are the chief requisites. Interesting tables and chairs may be made or renovated from castoffs.

The location of the most used dining space should be such as to make it sunny and cheerful and give a pleasing view. From the standpoint of carrying out the routine work of meal preparation and service, it should be next to the kitchen or readily accessible.

A consideration often overlooked is the number and convenience of electric outlets provided, if electric current is available. These outlets should be so placed that the use of the waffle iron will not block the kitchen door, nor cause cords to cross a traffic lane with the attendant hazard of tripping. If the use of two pieces of electrical equipment such as a percolator and a toaster is common, outlets should be provided that allow the placement of these where desired without a tangle of cords and plugs.

Generally speaking, the sleeping quarters are the most important part of the private or rest area. It is here that complete withdrawal from the outside world is sought. Warding off the intrusions of persons and noise and providing comfort are functions of plans for the private or rest area.

To provide for privacy the sleeping quarters should be somewhat withdrawn from the social and service areas of the house. Each bedroom should be reached directly from a hall, that is, it should not be necessary to go through another bedroom to reach a bedroom. Sleeping quarters at the rear of the house are usually protected from the noises of the street and shut off from the din that may accompany the social life of the family group. However, the location of the garage at the rear of the house, whether it be attached or apart, tends to disturb the quiet of this region. Much depends upon the hours of use given the car or cars. Frequent arrivals or departures at midnight or later hours mean broken rest for family members whose bedrooms are in that section.

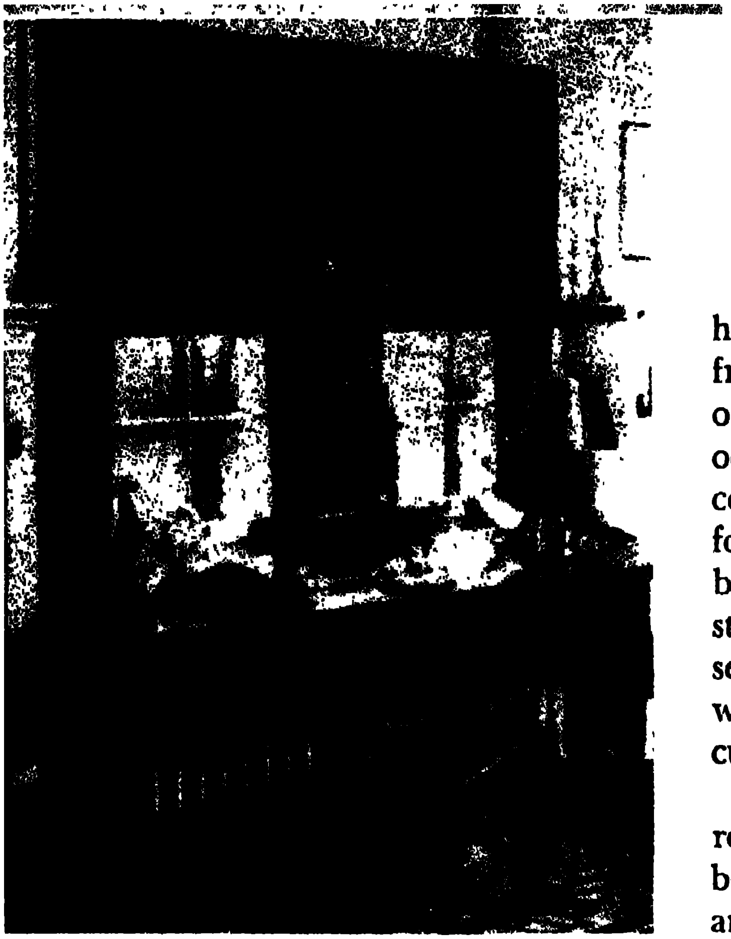
Other considerations must be made if the plan of the house is to provide comfort in the rest area. Health authorities stress the need for plentiful ventilation in the sleeping rooms. During periods of warm weather, cross ventilation is almost imperative, and is desirable in any season. Sunshine in the room some time during the day has a definite psychological and hygienic value. The position of the windows should be such as to provide good ventilation and adequate light and at the same time allow free wall space suitable for placement of large pieces of furniture. The plan should provide for the number of bedrooms needed by the family. The maximum

Courtesy *Popular Home* and Hedrich-Blessing Studio

Built-in cases in the bedroom furnish needed storage and allow for floor space.

number of persons to occupy a bedroom should not exceed two. If the family includes a boy and a girl, the number of bedrooms needed will be greater by one than that regarded as necessary for two children of one sex. Usually, three bedrooms are listed as the minimum essential for a family.

The location of the bedrooms is important. In older houses often all the bedrooms are upstairs. Today, several reasons are accepted as indicating the need for a downstairs bedroom. In times of sickness it is desirable to have at least one bedroom downstairs, which may at other times be used as a multiple-purpose room. If a room or rooms are provided for domestic help, a considerable degree of separation is desirable. Many parents wish to segregate their own room somewhat from the children's rooms, with the exception of the time when the children are very young. A dressing room adjacent to the parent's room could be used for a nursery until it is time for the child to have a room of his own.



Reprinted from *Better Homes and Gardens* magazine

A dressing table-desk in front of a window.

Guest bedrooms seem to have disappeared somewhat from the modern house. If one is included, its use is so occasional it need not receive as much consideration for its orientation as the bedrooms that are in constant use. Such a room may serve as a multiple-use room when there is no guest to occupy it.

Suitable size for a bedroom is affected by the number of persons to occupy it and the habits of those persons. Bunk rooms for a child could be as small as eight feet by eight feet, but this is smaller than most people desire. For one person a bedroom 10 feet by 11 feet is considered almost too small, and 11 feet by 13 feet is more desirable. For two people a room 12 feet by 14 feet is average if the activities are confined to sleeping and dressing; however, even for these a little more space would allow for greater privacy. For adults this might provide for reading, sewing, lounging, and quiet hobby work. For children it might provide for indoor play, study, and entertaining a chum.

The bed, because of its size and function, is the center of interest in the bedroom. A free-standing bed position with the head against the wall is desirable if there is sufficient space. If the bed must be placed in the corner of the room, it is desirable that a few inches be allowed on the far side and at the foot so that bed making can be performed easily. Other pieces of furniture may be placed around the room with proper regard for convenient use, circulation through the area, and for the sizes and proportions of wall space. Provisions for dressing should be made near closets and chests so placed that traffic routes throughout the entire room are unnecessary. Ample mirrors and good illumination are essential to a successful bedroom. Doors are well placed if they open back against a wall space and do not hide a part of the interior or interfere with the use of any piece of furniture. Necessary measurements to allow in a bedroom include:

Traffic routes	3 feet
For setting furniture	
Between furniture and wall	2 inches
Between pieces of furniture	4 inches
Between bed and wall for making bed	1 foot, 6 inches
At foot of bed	2 feet
Between twin beds (allow for night table)	1 foot, 6 inches to 2 feet
Between furniture or furniture and wall	1 foot, 6 inches to 2 feet

The house plan should provide adequate closet space opening from the bedroom to enable each occupant to store his possessions as he chooses. In general, the following is offered as guides to be used in checking bedroom closet facilities in a given floor plan: [1]

1. Conveniently arranged space sufficient for the wardrobe of the persons to occupy the room. Ordinarily it should contain 6 garment hooks, a rod 24 inches long for hangers, a hat shelf 48 inches long, space for 6 pairs of shoes for each person using the closet.
2. The shallow closet is the most economical of space. The rod necessarily extends parallel with the door. The closet should be 24 inches deep to accommodate the hangers. Doors should open almost the entire length of this shape of closet for convenience in reaching in.
3. A heated dressing closet suitable in size is a convenience if it is desired to use the bedroom as a studio, or if it is preferred to keep the bedroom cool for sleeping. Wilson suggests for this kind of closet, a space four feet by five feet, six inches for one person, and a space five feet by six feet, six inches for two per-

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[1] Maud Wilson, "Can You Have Too Many Closets?" Radio Talk No. 2 of 1935 series.

sons. The location of such a room near the entrance of the bedroom makes its use convenient for two persons whose hours of retirement may be somewhat different. If a bathroom is a part of this arrangement, its noise is somewhat insulated from the bedroom by the dressing room closet.

4. Each closet in ordinary use should have some means of ventilation. A window in the closet is desirable if it does not let in direct sun on the clothes. Vents to the outside wall, in the door, or in a common wall between two adjoining closets are helpful; however, not to be overlooked is the closet that can be sealed tightly to prevent the invasion of moths.
5. Means of illuminating each closet should be provided. An electric light above the door is desirable. Where there are no electric connections, a flashlight on a string can be hung by the side of the door.

The American concept as to what constitutes adequate bathroom facilities is changing. There is an increasing demand in rented houses that two bathrooms be provided, and many would-be home builders toy with the idea of a bathroom for each bedroom. However, such an arrangement remains the exception rather than the rule, and for the modest home that must meet the shelter requirements of the average American family, rarely will more than one bathroom be provided. The adequacy of the provision afforded in that one bathroom then becomes important. The minimum size for a bathroom with tub as established for certain of the government low-cost housing projects is 5 feet by 6 feet, 6 inches. A bathroom with shower might be put in an even smaller space. Additional space, that to some seems waste space, may be regarded as essential by the mother whose daily routine includes bathing one or two small children. Research seems to indicate that a bathroom used for this purpose should be 8 by 10 feet.[1] However, beyond a given point, space assigned to bathrooms should be regarded as a luxury rather than a necessity. Checking the bathroom arrangement as shown by the floor plan is an advisable procedure. The ar-

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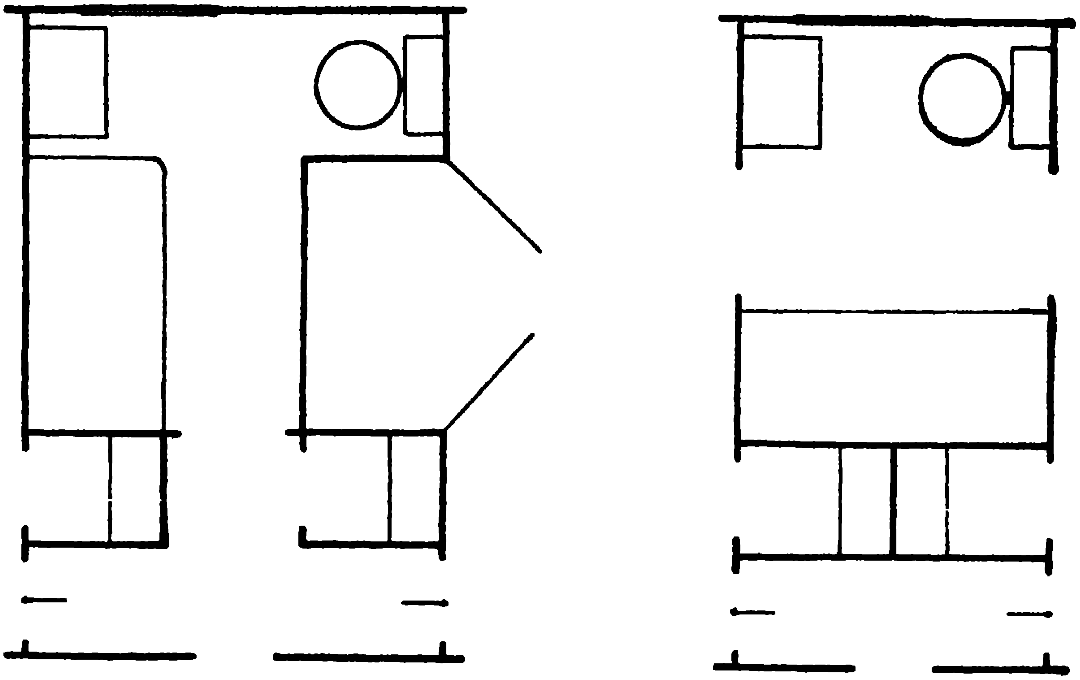
[1] Rogenia Green, *Certain Storage Requirements for Families with Children.* Unpublished Master's Thesis, Kansas State College, 1947.



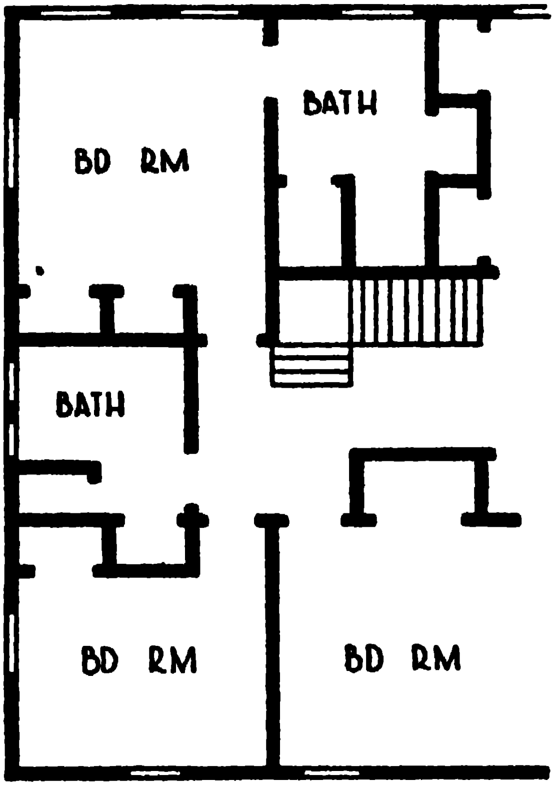
Courtesy *Architectural Record* combined with *American Architect and Architecture*

A bathroom entered from the hall (*left*) is more accessible than one entered from each of two adjoining bedrooms (*right*).

rangement should be such that there is no sense of crowding experienced in the use of the essential equipment. The equipment should be standard in quality, properly installed, and in keeping with the rest of the house. The floor plan should be checked to make sure that adequate illumination is provided about the mirror, and that safety switches, so located as to remove the hazard of shock, are provided. A check should be made to insure that all finishes are waterproof, durable, easily cleaned, and free from cracks.

If there is but one bathroom, entrance to it should be from a hall that connects to the main parts of the house. Accessibility to it from each bedroom is important. In homes in which there are children it is desirable to reach a bathroom readily from the kitchen and from outside entrances. If there is a half-bath on the first floor, many prefer to have it accessible to but not necessarily a part of the front hall. If this hall joins most of the main downstairs rooms, the half-bath is available to all and provides privacy.

Noise of plumbing in operation may be annoying to those



Bedrooms may be insulated from noise in the bathroom by building closets between each joining bedroom and bath.

who have retired, especially if the bedroom adjoins the bathroom. It is sometimes possible to insulate this noise by arranging a series of closets between the bedroom and the bathroom.

Additional privacy may be attained through the installation of a duplex bathroom containing a tub, shower, and water closet in one compartment and two lavatories in separate cubicles. A lavatory in a bedroom is not wholly unacceptable if it can be installed in a niche or enclosed behind cabinet doors.

The service or work area is the part of the house in which the household operations are carried on. In most homes these operations consist of activities connected with the preparation and care of food; with the making and care of clothing and household linens; with keeping the house clean and in order; and with the care of children. In addition to these, many homes must provide for other activities, such as the work connected with heating the house, care of the yard, and pursuit of avocational or vocational interests carried on in the home. The number and character of the operations to be provided for affect the allotment of space to this area.

The kitchen is usually the most important room in this area. Traditionally, the kitchen has been at the rear of the house. This location may have been chosen because facilities for garbage disposal and for fueling the heating and cooking equipment were unattractive, and the kitchen was of necessity placed near them. More recently these functions have

A duplex bathroom, with lavatory and stool in one compartment, and lavatory and bathtub in another.

been provided for within the house. In addition there has been a demand for more privacy in the living area which has pushed it to the back. For these reasons it is not unusual now to find the kitchen on the side of the house or even in the front.

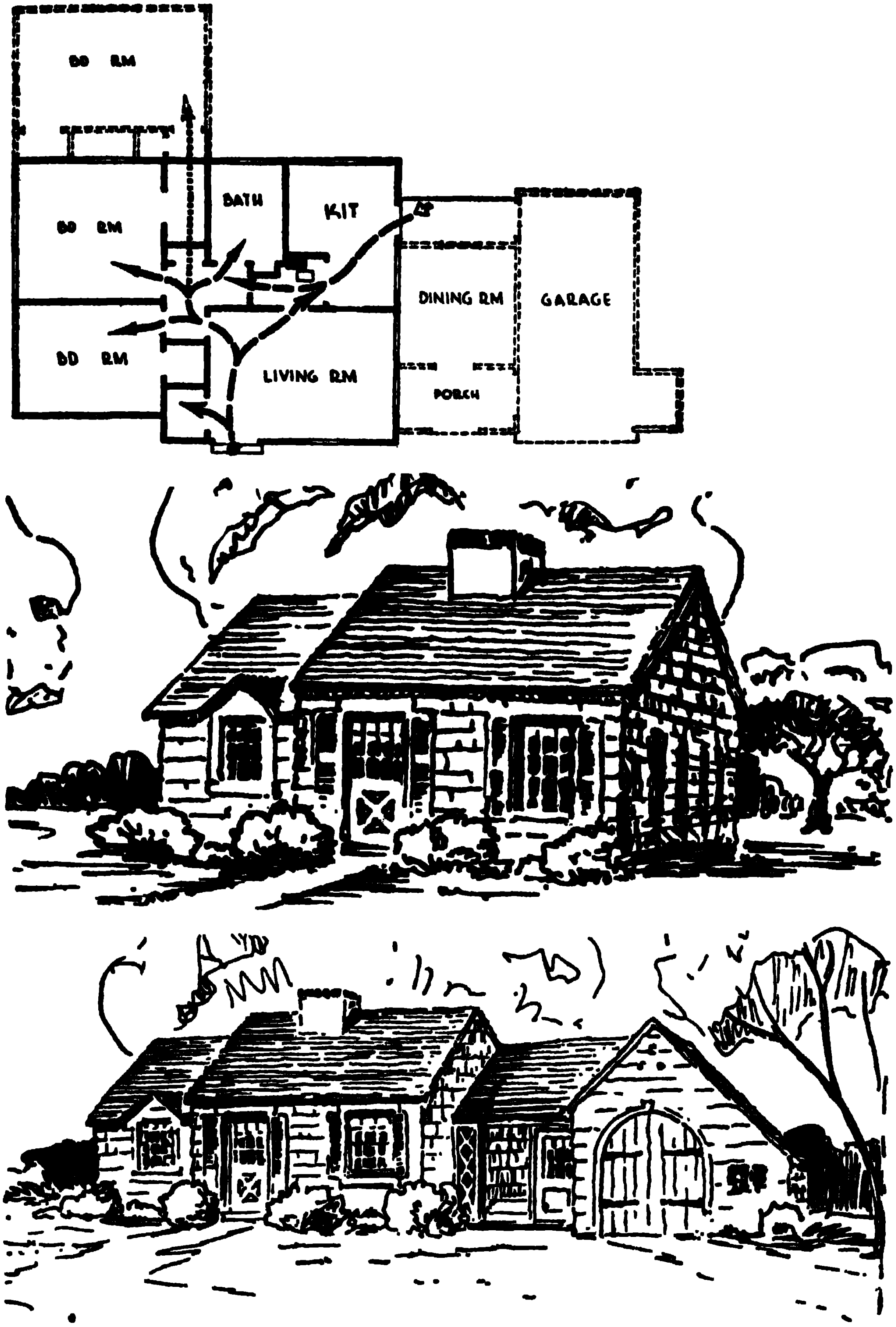
It is often suggested that the house plan provide for a second important room in the work area to be devoted to the planning, making, laundering, and repairing of clothing and household linens. In some cases such other work as planning the budget and keeping the accounts could also be done here. Lacking other space, it could be used as a playroom for the children. A second work room, if provided, should connect with the kitchen so that simultaneous activities in the two rooms may be carried on with less stress. For both rural and urban homes this seems a sensible suggestion; however, judging from the present trend in housing the majority of urban families still make provision for the laundry in the basement. Perhaps this may be due to the fact that builders still have a tendency toward overexcavation and hence the basement space must be utilized for some purpose!

The usability of any house plan is greatly affected by the storage facilities provided. A kitchen minus proper storage for food supplies and utensils, a bedroom without storage for personal belongings, a living room without storage for reading material or games, an entrance without a place to put wraps, all have their efficiency markedly decreased. Since space is often at a premium, built-in storage may be utilized more advantageously than any cabinet purchased on the market. Therefore, when checking a house plan it is well to give detailed thought to the possibilities of storage which are offered.

As the housing needs of the family change with the various cycles of family life, a house plan may wisely provide for flexibility of use and facility of alteration and extension. This is also an important factor in the marketability of a house. Not infrequently a house plan is made to meet specific ideas or needs so unusual that it is unsuited for the use of others. If the plan is specific and inflexible, its uniqueness may serve to limit the sale value of the property.

Many a house would be enhanced by the inclusion of one room which is planned to be thoroughly flexible to accommodate many purposes which are usually divided into small, little-used rooms or not included at all. For instance, a den may serve a variety of purposes. With some families it may be the place where the father entertains his men friends, anc where at times, the mother interviews agents and tradespeople. It should then be considered a part of the social or public area. On the other hand, it may be a place where some member of the family does some extra-vocational work, being rarely entered by other members of the family or the public. In this case it is a part of the service or work area. If it is used mainly as a place where members of the family retire for quiet or rest, it is then a part of the rest or private area. The nursery probably could be considered a part of the rest or private area, but it also has functions of the service or work and the social or recreational areas.

It is wise to give some thought to the expansion of a house. In an enlarging family, bedrooms are the first additions and



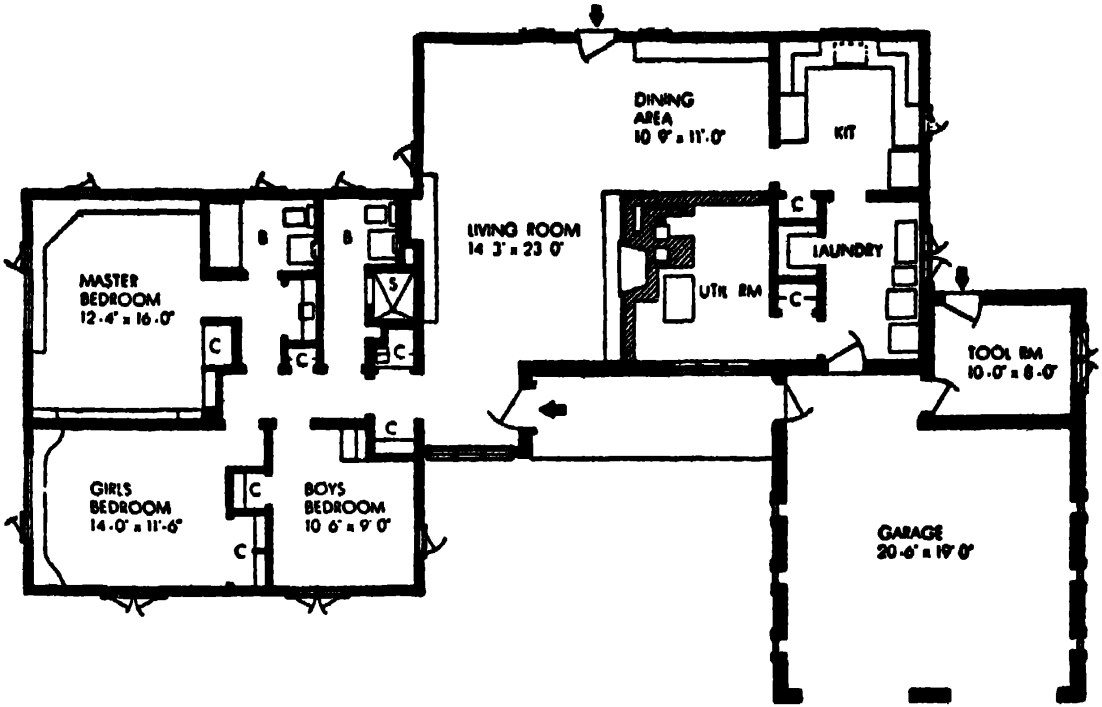
Top, this house started as the small house shown by the heavy lines of the floor plan drawing. When the family grew and a third bedroom was required, a dining room was also desired. Access was achieved through the former closet and through former windows. *Center and bottom*, before and after remodeling.

dining areas are the next. Sometimes such additions are extremely difficult or impossible.

In addition to the points already raised, a given family may deem some other considerations as important in choosing a house plan. Families for some of whose members stairs may be difficult may wish a plan with all the rooms on one floor, or at least a bathroom and one bedroom on the main floor. Families with children or with ailing members may like this same arrangement. Homemakers who do their own work may especially desire a floor plan all on one level. Other advantages of a one-story house include: it is quieter because there is no noise from upstairs, and rooms can be arranged to buffer noise; it is suited to indoor-outdoor living. Two-story and one-and-one-half-story houses have economy in building, and better air circulation usually possible in bedrooms is in their favor.

There are certain common shapes or patterns under which most houses can be grouped. The first of these is the square house, the proportions of which are less satisfying than those of many others; next is the rectangle so successfully and satisfyingly exemplified by many Colonial houses; variants from the rectangle, offering larger space, include the L, the T, the U, the E, and others. Seemingly of a separate lineage is the hollow square, which has come to us in the charming versions of the Spanish house, built about a patio. All of these shapes are to be found in the American scene today in connection with floor plans of varying desirability. Shape alone does not offer a sound basis for planning the house.

Another consideration, sometimes overlooked, is the relation of the house plan to the lot on which it is placed or is to be placed. One should be concerned with the total effect of one's home. The "togetherness" of the house and lot should be more important than the completion of some cherished architectural design that may be wholly unsuited to the setting. Important considerations in the successful relation of the house to the lot are: size, shape, topography, and vantage point for view. One sees so many huge houses, that might be suitably set on a half block, literally crowding the edges of


DINING AREA 10 9" x 11'-0"
KIT
LIVING ROOM 14 3" x 23 0"
LAUNDRY
UTIL RM
C
C
MASTER BEDROOM 12-4" x 16-0"
B
B
S
C
C
C
C
TOOL RM 10-0" x 8-0"
GIRLS BEDROOM 14-0" x 11'-6"
C
C
BOYS BEDROOM 10 6" x 9' 0"
GARAGE 20-6" x 19' 0"

Courtesy *Popular Home*

When a U-shaped house is chosen the traffic routes are not definitely defined.

their small lots, that there is little need to labor the point of size. Examples of contradictions of the house to lot shape and topography are perhaps less frequent but quite as glaring. A narrow, high house on a bare high hill remains in one town as a reminder of one builder's blunder.

Basic implications in the choice of a house plan seem to be that although a house plan should be artistically satisfying from all standpoints, its desirability should first be checked in the light of the fundamental needs, interests, and activities of the specific family concerned. The plan should be scrutinized to determine the success with which interrelations between areas necessary for the ease, efficiency, and satisfaction of living in the house have been provided. Some flexibility is desired in the floor plan so that it may be adapted to meet the needs of other families and hence not have too sharp a limit on its sale value. The house plan should fit the lot on which it is placed, harmonizing with it in size and shape and seeming to belong to the topography. A house so planned should be satisfying.

Suggested Activities

1. Judge several house plans in regard to their adequacy in providing space and arrangements for the interests and activities of the family chosen in Problem 2.
2. Collect house plans in which good traffic routes are present and in which other requirements are met satisfactorily.
   a. A one-story house.
   b. A two-story house.
3. Find a house plan which may be zoned for certain uses, as noisy play of children or adolescents, quiet reading or rest by other members.
4. Find a house plan which has a room for flexibility in its use.
5. Find a house plan that has an outdoor living space adjoining the indoor living area.

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Problem 4. HOW IS THE HEALTH OF THE FAMILY AFFECTED BY THE HOUSE?

The correlation between conditions of substandard housing such as exist in both rural and urban slums and the prevalence of disease and degeneracy has been greatly publicized. There is no doubt of the relationship of certain factors in housing to the occurrence of diseases although in a study of the causative factors of these, housing is seldom mentioned. Moral degeneracy also is common when low standards of housing exist. It is impossible to separate influences from the actual housing conditions so often linked with other injurious circumstances such as poverty, ignorance, vice, and uncleanliness, with the accompanying consequences of unsatisfactory food, scanty and ineffective medical and nursing service, monotonous or difficult labor, unhygienic personal habits, noise, bad air, dust, and other disadvantages.

We do know, however, that man's health and happiness are influenced directly by his environment. In the plant kingdom, vigorous plants will not develop from even superior seed unless proper conditions of moisture, temperature, soil, and cultivation exist. On the other hand, poor seed with the advantages of desirable environmental factors may develop into a fairly vigorous plant. Human beings react to their environment in a somewhat similar manner. Inadequate conditions of living may destroy the possibilities of good stock, and poor stock may be brought to its full capacity under improved conditions. Man is peculiarly able to adjust himself to his environment and the environment to his needs, although wide individual variations in this regard are noted. Some gifted people have emerged from extremely adverse living conditions under which others have succumbed. Also, other persons who have the best in housing conditions may be broken by illness or be drawn into ruin. Housing is not the total cause of an individual's state of health. It is our purpose here to study not only the aspects of housing which contribute to the low state of health and morals found in the substandard areas but also those aspects which contribute to maximal health, comfort, and efficiency—physical, psychological, and moral.

Investigation of slum areas and others where poor housing is general has led to attempts at listing the *lacks* that account for the poor health record. These include lack of room, or overcrowding, under which comes overcrowding of rooms and overcrowding of lots; lack of sunlight and fresh air; lack of drainage resulting in damp basements; lack of adequate essential fundamental equipment; and lack of wholesome community environment. The effect of the slum environment upon health is shown by a comparison of relative mortality rates, and infant mortality, for the slum areas and other residential districts. The relation of housing to the incidence of disease may also be studied, whether the cause be bacterial, parasitic, chemical-toxic, or nervous. In each of these categories, there is evidence of the protective or destructive influence of housing conditions.

Crowding or lack of room for the family members has long been, and continues to be, one of the most common conditions in substandard housing. It may be caused by shortage of housing, poverty, or ignorance of healthful living standards. It exists in a diversity of conditions, from the densely populated cabins in shanty towns and in isolated rural sections to the urban apartment, possibly in a desirable location, shared by two or more families. A condition of crowding varies with geographic areas and is greater as a whole for the colored population. It increases with the size of the household and is greatest at low rental levels. The percentage of persons living under crowded conditions decreases as age increases.

Historical records show that overcrowding has long been a problem. In this country it became prevalent because of scarcity of materials in a form ready to use, because of rapid population growth due to immigration, because industrialization demands living in a central location, and because landlords profit by over-renting.

Early efforts to determine what should be considered overcrowding led to the establishment of standards based on cubic feet of space, 300 cubic feet being allowed for an adult and 200 cubic feet for a child. Translated into room sizes this means a space five feet by six feet for an adult and a space four feet by five feet for each child if ceilings are ten feet high. These standards were an improvement over the crowded conditions found in many cities at the time of the Industrial Revolution and later. More recently to delineate requirements for Public Housing, Winslow[1] indicated desirable space in terms of square feet of floor space: one person, 400 square feet; two persons, 800 square feet; three persons, 1000 square feet; four persons, 1200 square feet; five persons, 1450 square feet; and six persons, 1550 square feet.

Another method of measuring room congestion is the coefficient of room density. This is expressed as persons per room, the number of individuals composing the family divided by the number of rooms they occupy. As many persons as rooms may generally be accepted. Room density greater than one person per room has been found to have an important relation to general death-rate, infant death-rate, and the prevalence of communicable diseases. The United States census defines crowding as anything above 1.5 persons per room. Even these standards are incomplete inasmuch as no mention is made concerning ventilation, sunshine, and other health promoting features. Bathrooms, closets, pantries, halls, screened porches, and unfinished rooms in basement or attic are not counted as rooms. A summary of the situation in the United States is shown in the table on page 64.

Overcrowding almost invariably means increased opportunity for the communication of disease. Such contact diseases as common colds, sore throats, bronchitis, whooping cough, influenza, diphtheria, scarlet fever, measles, mumps, chicken-pox, cerebrospinal fever, and even pneumonia and tuberculosis are observed to have a much higher rate when

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[1] Winslow, C. E. A., from a speech in 1950 to the National Housing Conference.

DWELLING UNITS BY PERSONS PER ROOM AND TENURE, FOR THE UNITED STATES, URBAN AND RURAL: 1950.[1]

Persons per Room	Per Cent Distribution				
	United States	Urban and Rural Nonfarm			Rural Farm
		Total	Urban	Rural Nonfarm	
All Occupied Units					
Total Dwelling Units	42,826,281	37,105,259	28,492,186	8,613,073	5,721,022
Number Reporting	42,154,443	36,548,706	28,097,633	8,451,073	5,605,737
Percentage					
0.75 or less	*60.2*	*60.6*	*61.4*	*57.9*	*57.4*
0.76 to 1 00	*24.1*	*24.7*	*25.3*	*22.6*	*20.3*
1.01 to 1.50	*9.5*	*9.1*	*8.6*	*10.8*	*12.1*
1.51 or more	*6.2*	*5.6*	*4.7*	*8.6*	*10.2*
Owner-Occupied Units					
Total Dwelling Units	23,559,966	19,801,646	14,376,594	5,425,052	3,758,320
Number Reporting	23,198,854	19,512,658	14,185,434	5,327,224	3,686,196
Percentage					
0.75 or less	*67.9*	*68.5*	*69.8*	*65.2*	*64.8*
0.76 to 1.00	*21.0*	*21.3*	*21.7*	*20.5*	*19.3*
1.01 to 1.50	*7.3*	*6.9*	*6.2*	*8.7*	*9.8*
1.51 or more	*3.7*	*3.3*	*2.3*	*5.7*	*6.1*
Renter-Occupied Units					
Total Dwelling Units	19,266,315	17,303,613	14,115,592	3,188,021	1,962,702
Number Reporting	18,955,589	17,036,048	13,912,199	3,123,849	1,919,541
Percentage					
0.75 or less	*50.6*	*51.5*	*52.8*	*45.6*	*43.1*
0.76 to 1.00	*27.9*	*28.6*	*29.1*	*26.3*	*22.4*
1.01 to 1.50	*12.2*	*11.7*	*11.1*	*14.6*	*16.5*
1.51 or more	*9.2*	*8.2*	*7.0*	*13.5*	*18.0*

the room density is high. Reports for the city of Sheffield, England show that with a room density of less than one person per room, the case rate for tuberculosis was 2.18 per 1000; with a room density of more than two persons, the case rate was 4.43 per 1000, or more than doubled. As early as 1925 the Children's Bureau studied seven American cities and found that the infant death rate rose sharply as the room density increased from less than one to more persons per room. For example, when the average number of persons per room was less than one, the death rate per 1000 of infants surviving two weeks was 52.1, but when the number of persons per room was two and more the death rate was 135.7,[2] almost three times as high.

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[1] *Census of Housing: 1950 Vol. I General Characteristics,* Part I *United States Summary* from Table 11, pp. 1–8. Government Printing Office, Washington, 1953.

[2] *Causal Factors in Infant Mortality,* U. S. Department of Labor, Children's Bureau Pub. No. 142, 1925.

The effect of crowding on the mental health of family members is less frequently discussed than is its bearing on physical health. Statistical data to support discussion are not readily available. Perhaps such evidence is not necessary to convince the average person that a room density of four persons presents more stimuli to the nervous mechanism of the body, produces more fatigue, and presents greater possibility of vexation and frustration than does a room density of one. Just the mere increase in voice sounds that comes with three additional persons is sufficient to cause some stress.

The disastrous effect on the personality of an individual caused by the complete lack of privacy is frequently mentioned, but for obvious reasons this aspect of poor housing does not lend itself to controlled investigation. Whether the absence of privacy leads to perversions and immorality, or whether it is a protection from them is not ascertainable. If both sexes and all ages have to share the same sleeping room and possibly the same bed, modesty as it is usually known is an impossibility. The round of human activities, from life's beginning to its end may all take place in the presence of the entire family. The significance of any act loses in meaning for the individual as it becomes a group experience. The lack of space and privacy for the normal activities of personal living and the resultant increase in tension among family members tends to drive family members away from home and to throw them into the path of delinquency.

The effect of crowdedness on child training was noted by Breckinridge and Abbott as follows:

> In the case of a family where the home is crowded, where the conditions either within the house or in the neighborhood are bad, there is less chance for training in the case of younger children than in the case of the older ones, because with the birth of each child the strain upon family resources becomes greater, the opportunity of the mother to safeguard the child is lessened, and he is at the mercy not only of the older members of his own family but of the disorderly persons of the neighborhood.[1]

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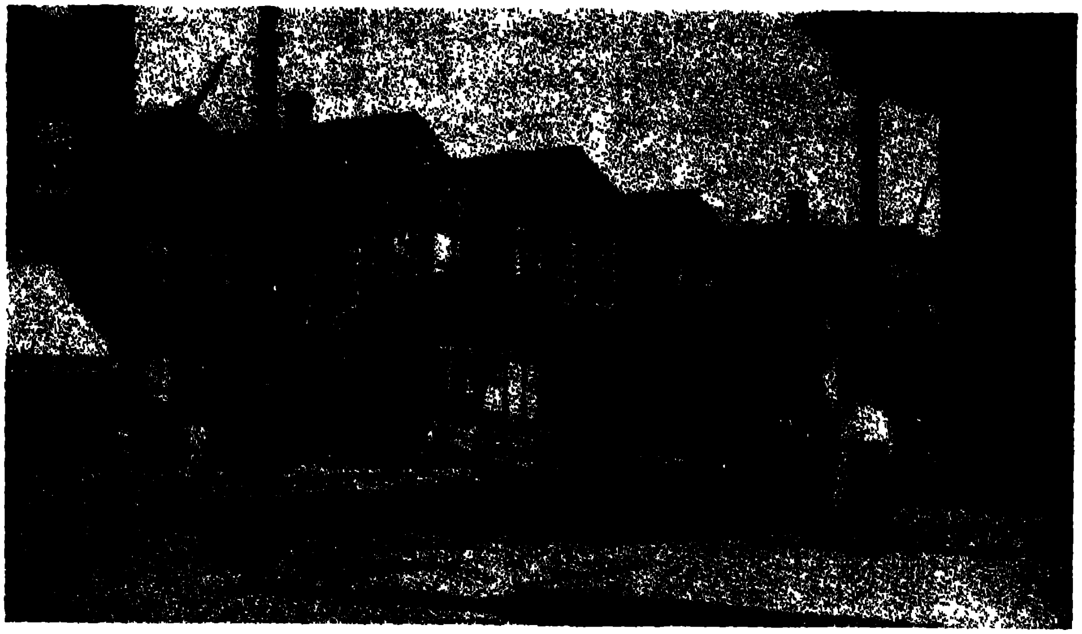
[1] Sophonisba P. Breckinridge, and Edith Abbott, *The Delinquent Child and the Home*, p. 118. Russell Sage Foundation, New York, 1912.



Courtesy U. S. Housing Authority

Crowding many small houses on a lot reduces the amount of light available, and lessens the circulation of air around them.

The consideration of overcrowding given does not take into account certain conditions of family composition, as sex, age, and others which modify social overcrowding. Benjamin R. Andrews specifies that overcrowding could be defined as the absence of any of the following conditions: [1]

1. A separate-housing unit for each natural family, with its own toilet accommodations.
2. Lodgers, if living within a family, must have separate room and separate toilet accommodations. . . .
3. Separate bedrooms for boys and for girls, with a separate bedroom for parents.
4. Not over one person in a bedroom except in case of husband and wife, a small child in parent's room, or two adults of the same sex.
5. One room at least for the common life of family not used for sleeping (may be kitchen, or kitchen and dining room, or living room, or some other).

Even these standards do not define the size of rooms nor indicate access to air and light. Experience in barracks and

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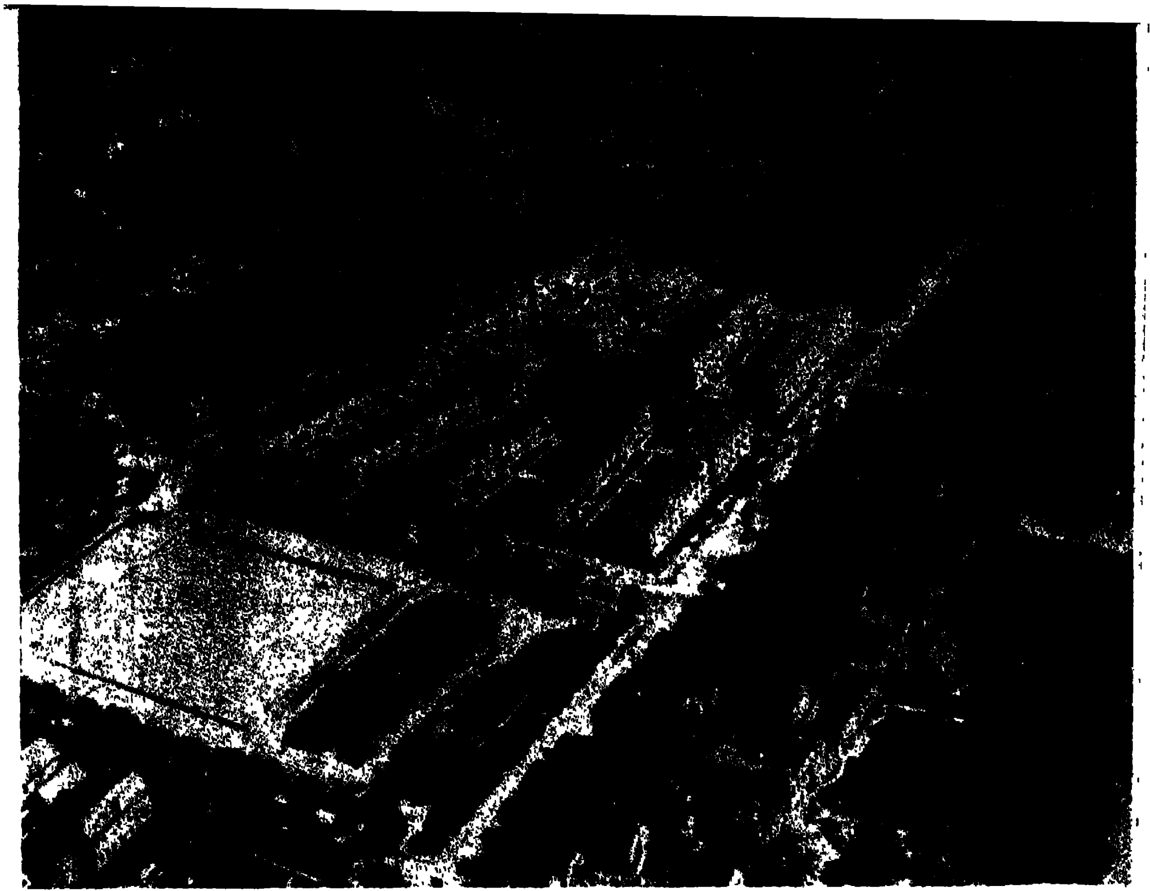
[1] Benjamin R. Andrews, *Economics of the Household,* pp. 246–247, New York, 1935. Reprinted by permission of The Macmillan Co., publishers.



Courtesy Federal Public Housing Authority

A slum clearance project. Note that not more than 30 to 50 per cent of the land is covered with the apartment house building.

dormitories has shown that a distance of less than six feet between the centers of adjoining cots, or three foot space between the beds themselves may lead to the spread of communicable disease by the dissemination of mouth spray from an infected occupant.[1]

Lot overcrowding often parallels room overcrowding and adds to the already serious condition and health hazards. Here, as in the individual dwelling, density of population is the dependable measure. When individual dwellings are considered, authorities generally agree that not more than from four to twelve of the better one- or two-story houses should be built on one acre; the lower number being for the rural village without a sewage system, and the higher number being group houses. The distance between houses in this case should be at least the distance from the ground level to the eaves.[2] The lot should be wide enough and deep enough so that each room of the house built on it should have sufficient light and access to air from open spaces on the lot itself without depending upon the space of neighboring lots.

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[1] *Housing for Health*, p. 210. Lancaster, The Science Press Printing Co., 1941.

[2] Reported by Greta Gray in *House and Home*, Third Edition, revised, p. 279. J. B. Lippincott Co., Chicago, 1935.

The same area may be built up with row houses or two- or three-story apartments resulting in a density of 25 to 60 families to the acre. Land crowding has perhaps been the most common characteristic of apartment buildings, particularly for the highest and the lowest income groups. Some buildings on costly land show a population density from 200 to 300 families per acre. The desire for large rental returns led, in the past, to the covering of as much as 80 per cent of the lot with building. Windows or shaft openings of the dumbbell type were the wholly inadequate provisions for sunlight and ventilation for many apartment dwellers. When many-storied buildings were erected in an effort to get returns despite rising land values, the width of the street was not sufficient to permit the sunshine to enter the dwelling, even in the case of the outside apartments of the lower stories of an apartment house. It is now recommended that not more than 30 to 50 per cent of the lot be covered by the many-storied apartment house buildings.[1]

In regard to overcrowding, Straus says that "whether an area is overcrowded horizontally by buildings that cover too much of the site, or overcrowded vertically by buildings that rise too high, the result is the same." [2]

As might be expected, a number of studies show high tuberculosis rates in overcrowded quarters, basement dwellings, tenements with windowless rooms, and regions of high density of population. There is a possibility that this disease is latent in many persons, in which case poor housing might contribute to its development. It is known, however, that the tubercle bacilli have exceptional viability outside of the human body, virulence apparently being maintained in a dark, moist place for several months outside the body of the host.

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[1] Henry Wright, "The Apartment House," *The Architectural Record*, vol. 76, p. 187, March, 1931.

[2] Nathan Straus, *The Seven Myths of Housing*, p. 53. Alfred A. Knopf, New York, 1944.

It seems possible that infection could result from living in a filthy, dark, damp place infested with this type of bacteria. Following infection, poor housing would foster the rapid development of the disorder.

Other bacterial diseases affecting the respiratory organs, such as many of the common children's diseases and colds, influenza, bronchitis, and pneumonia, are designated as "housing diseases" inasmuch as their case incidence can be reduced by improved housing measures. It is known that infection with microorganisms results readily when there is gross contamination through personal contact with moist secretions. Breathing air vituated with dust and fumes may cause irritations which facilitate infection. In crowded and dark quarters it seems probable that contaminated furniture, stair railings, and fixtures may be means of transmission of these diseases. More sunlight and fresh air, less overcrowding, and open stairs are housing improvements recommended to reduce spread of respiratory infection.

The question as to whether venereal diseases are transferable from contaminated toilets is still debated. It is known that the spirochete which causes spyhilis is a delicate organism easily destroyed. Parran says "except when acquired before birth, the infection enters the body through the skin or mucous surfaces by direct contact with open lesions or with articles recently soiled by spirochete-laden secretions."[1] Overused and unclean common toilets seem possible carriers of this disease. At any rate, the American Public Health Association recommends that toilet seats should be of the open front type to avoid venereal disease transmission from this source.[2]

Of the intestinal diseases, typhoid fever and cholera may have considerable incidence in areas where the water supply in wells may be infected from outdoor toilets. Many examples could be cited of reports of epidemics of typhoid fever that have stricken whole families or devastated villages because the water supply had been polluted by a faulty system of waste disposal. Surveys made by the Children's Bureau, of which the one in Baltimore is typical,[1] indicated the importance of such sanitary provisions as a toilet connected with a sewer, a toilet used by one family only, and a bathtub. The infant mortality was much lower in homes having these essential sanitary facilities than it was in the homes lacking them.

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[1] Thomas Parran, *Shadow on the Land,* p. 3. Regnal and Hitchcock, Inc., New York, 1937.

[2] American Public Health Association, *Housing for Health,* p. 207. The Science Press Printing Co., Lancaster, 1941.

The presence of a private bath has come to be one of the criteria for healthful housing. A summary of the situation in the United States, according to the 1950 census, is in the following table.

CONDITION AND PLUMBING FACILITIES FOR THE UNITED STATES, URBAN AND RURAL: 1950.[2]

	Per cent Distribution				
	United States	Urban and Rural Nonfarm			Rural Farm
		Total	Urban	Rural Nonfarm	
Condition and Plumbing Facilities					
Total Dwelling Units	45,983,398	39,625,455	29,569,073	10,056,382	6,357,943
Number Reporting	44,502,192	38,367,616	28,762,804	9,604,812	6,134,576
Per cent					
Not dilapidated					
With private toilet and bath, and hot running water	*63.1*	*69.5*	*77.8*	*44.8*	*23.3*
With private toilet and bath, and only cold running water	*3.2*	*3.4*	*3.2*	*3.9*	*2.1*
With running water, lacking private toilet or bath	*12.3*	*11.4*	*10.5*	*16.0*	*15.0*
No running water	*11.5*	*7.0*	*2.0*	*21.9*	*40.1*
Dilapidated					
With private toilet and bath, hot running water	*1.4*	*1.6*	*1.8*	*0.9*	*0.5*
Lacking hot water, private toilet or bath	*8.3*	*6.6*	*4.7*	*12.5*	*19.0*

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[1] *Infant Mortality Studies*, p. 3. U. S. Department of Labor, Children's Bureau Pub. 138, 1923. See also: *Causal Factors in Infant Mortality*, p. 7. U. S. Department of Labor, Children's Bureau Pub. 142, 1925.

[2] *Census of Housing: 1950. Vol. I General Characteristics*, Part I *United States Summary*, from Table 7, pp. 1–4. Government Printing Office, Washington, 1953.

Often unsanitary housing conditions, which favor the presence of flies, mosquitoes, vermin, and rodents make proper care of food impossible. In these cases the household pests and the spoiling food alike may become direct channels for the spread of certain diseases. Corrections to current housing conditions that must be made to safeguard health include screening the house with a mesh wire that will exclude not only flies, but also mosquitoes if the district is malarial; and making the structure of the house proof against rodents and free from cracks and other structural defects that harbor vermin.

The parasitic diseases which are associated with the house include hookworm, malaria, ringworm, impetigo, and pediculosis. In certain rural sections in the South the lack of adequate toilet facilities and the attendant pollution of the soil from human feces has led to a wide dissemination of hookworm infection, which greatly reduces the vitality of a people and serves as a predisposing factor toward other diseases. The microscopic parasite conveying malaria is carried by the anopheles mosquito. Protection is afforded by the screening of windows to bar the pest and the removal of all stagnant water in which it might breed from about the house. Ringworm, impetigo, and pediculosis are primarily contact diseases, but they are probably transmitted also by handling household objects.

Fleas carried by rats are known to be carriers of the bacterium transmitting bubonic plague and endemic typhus. The rats gain entrance to houses through broken foundations and other openings. In port cities specifications for rat-proofing may be one of the provisions of the building code.

Of the hazards to health from chemical toxins related to housing, that from carbon monoxide is common. Poisoning from it may be due to improper stoking or management of the heating apparatus, to faulty construction of flues, or to defective fixtures and piping for gas appliances. The escape of sewer gas from defective soil pipes and traps is a nuisance and may produce nausea but does not result in serious health impairment.

Nervous impairment may include any disorder resulting from lack of privacy as previously mentioned, with the addition of that occasioned by eye-strain and incessant noise and confusion. Quiet has generally been considered essential to restful home life. The development of motor transportation and the tremendous growth of our cities have made quiet increasingly difficult to maintain. Noise seems an ever present part of modern life. There is scientific evidence that our reactions to noises take their toll in fatigue and consequently in health. The average person may have developed sensory adaptation of hearing to the point that he thinks he does not mind the noises, but laboratory tests show that his nervous system is adversely affected. During the waking hours, the constant impact of noises stimulating one increases fatigue and irritability. Investigations show that the restfulness of slumber is also lessened by noises that may not even arouse the sleeper, and that the tensions created may persist as long as a half hour after the noises were heard. These reports suggest the great importance of guarding against noises in sleeping rooms. Quiet in the sleeping room is not possible in a situation where there is a room density of three or four, or in situations where the lot crowding brings many families into a small area or where traffic is heavy, or where the noises of industry prevail.

Faulty housing conditions of various sorts are among the factors in the reduction of health and in the spread of a variety of diseases. Human beings vary in their relative constitutional immunity to diseases, and susceptibility to a given disease may be considerably affected by the mode of living. Resistance to tuberculosis, for example, may be reduced by overwork, undernourishment, alcoholism, or by inappropriate exercise. Resistance may be increased by living in fresh air and exposing the body to sunshine. In so far as improved housing tends to increase fresh air and sunshine in the homes of all classes, and to decrease possibility of direct infection, it may be assumed to improve resistance to this and other diseases.

Thus far, consideration has been given only to the effects of admittedly bad housing. Conditions which contribute to comfort and maximal health are also important. Sunlight is one of the most important aids to health. In the first place, it furnishes illumination, which aids in cleanliness, prevents accident, and facilitates conservation of vision. It kills microorganisms, beng one of the most effective bactericidal agents known. It contributes to the cure of rickets and bone tuberculosis and to the prevention of their occurrence. In addition, it causes beneficial chemical changes in the skin and blood, acts as a general tonic to health, promotes cheer and a sense of well-being.

In order to insure the health-promoting influences of sunlight and fresh air, Heydecker and Goodrich in the *Regional Survey of New York and Its Environs* give the following as a standard for supplying sunlight:

> Every dwelling and tenement should be so located and so planned as to provide in every living or sleeping room at least such an amount of direct sunlight or its equivalent as would be supplied by the sun shining for one-half hour at its maximum, or noon intensity through windows of the prevailing dwelling-house size, facing south at winter solstice.[1]

This implies that the net glass area should approximate 15 per cent of the floor area. It is an advantage to have the tops of windows as near to the ceiling as possible to allow an exposed vertical sky angle of at least 45 degrees at the window sill. Lower sills, however, allow for better circulation of air when the window is open. It is to be noted that for the same latitude the average daylight illumination is about 25 per cent higher for the Plains states and about 46 per cent higher for the Plateau states than for the Eastern states.[2]

There have been some attempts to increase the possible benefits of sunlight in the house by what is known as solar orientation. This means facing glass areas toward the sun in important rooms. It requires a knowledge of the angles of

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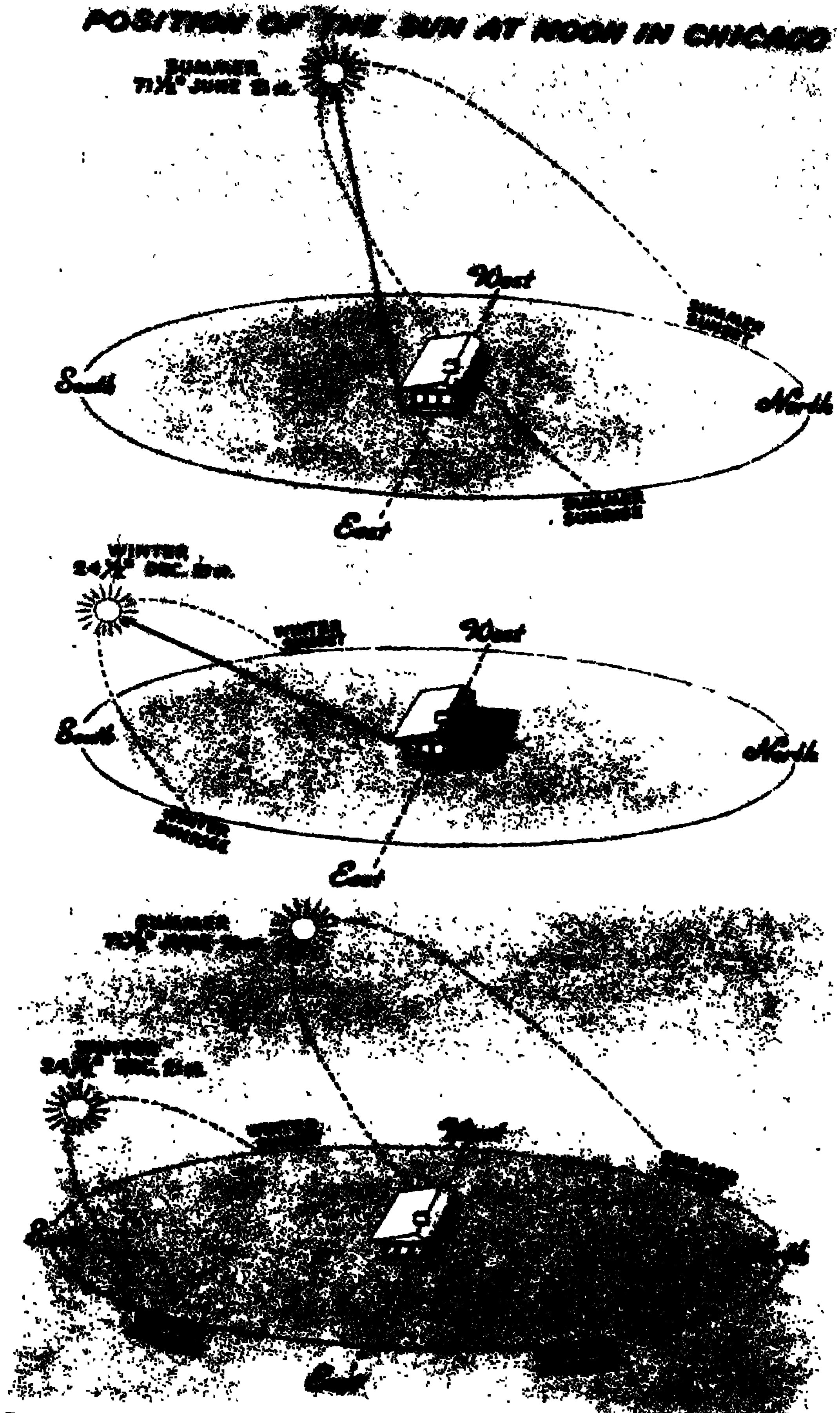
[1] Wayne D. Heydecker, and Ernest P. Goodrich, *Regional Survey of New York and Its Environs*, vol. 7, p. 159. Regional Plan Association, Inc., New York, 1929.

[2] American Public Health Association, *Housing for Health*, p. 192. The Science Press Printing Co., Lancaster, 1941.



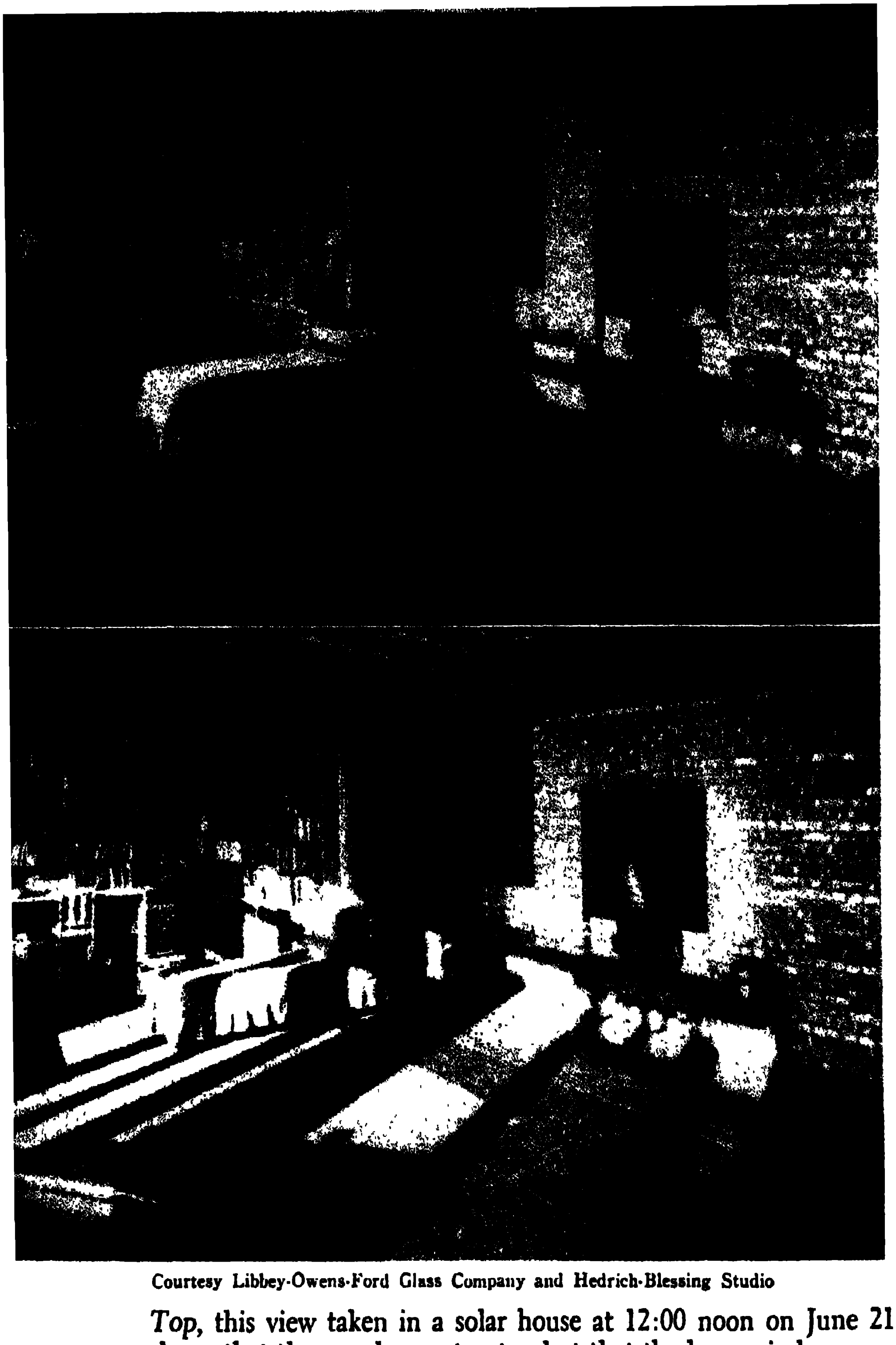
Courtesy Libby-Owens-Ford Glass Company and Hedrich-Blessing, Studio sunlight at different times of the day and at different seasons. The mechanical heat in the house is supplemented during the day by infrared rays which pass through the glass on a short wave length, strike and warm objects which in turn re-radiate on longer wave lengths not possible to pass through glass. If excessive loss of heat is to be avoided at night, all large glass areas should be of more than single pane in thickness, and other construction factors are important. It is known that for latitudes near 40 degrees north, the angle of the sun above the horizon at noon is about 30 degrees in winter and 60 degrees in summer. To temper the heat of the sun in summer, projecting eaves or an overhang must be provided over the glass areas. Winter sun because of its angle reaches the interior of rooms.

Courtesy Libbey-Owens-Ford Glass Company and Hedrich-Blessing Studio

This solar house was designed by George Fred Keck. The roof extension regulates the entrance of sunshine. The roof extension has porthole vents to prevent formation of hot air pockets.

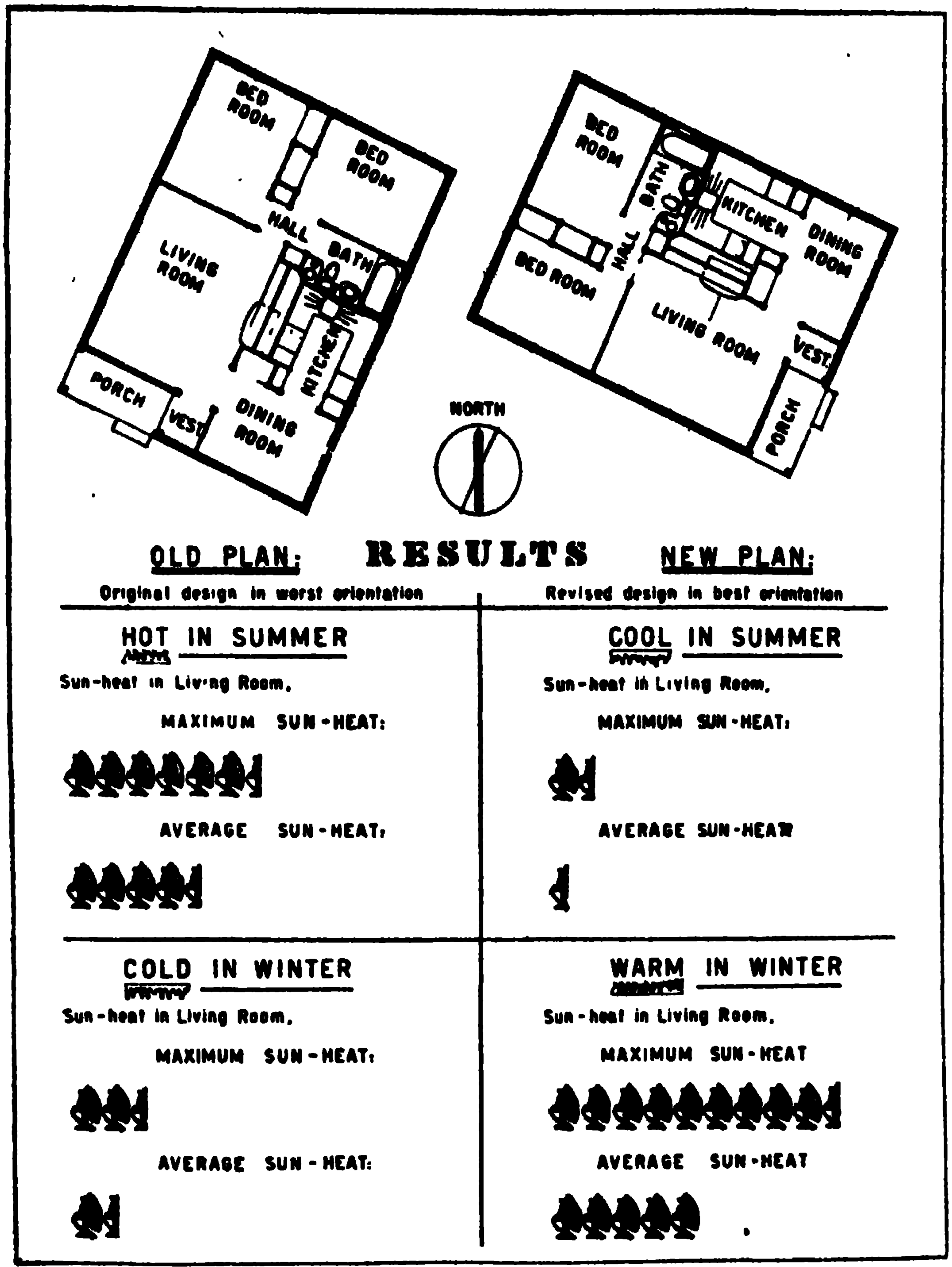
Sunshine in every room is very desirable but it cannot be achieved if the building sits with a due north exposure. The best position for a house is to face the sun about 30 degrees south-to-east. The winter sun hits such a house on all four sides during the day. In summer, the south side which is ordinarily beaten by the sun all afternoon is in the shade soon after noon and the hot morning sun on the north side is entirely avoided. If heat from a late summer sun is to be avoided, windows on the western side are omitted or shaded.

City dwellers suffer more during periods of severe heat waves than do residents of rural areas. This is because pave-



Courtesy Libbey-Owens-Ford Glass Company and Hedrich-Blessing Studio

Top, this view taken in a solar house at 12:00 noon on June 21 shows that the sun does not enter, but that the large windows permit more daylight to enter. *Bottom*, this view taken in a solar house at 12:00 noon on December 21 shows how the low-hanging winter sun penetrates the room.



Courtesy John B. Pierce Foundation

Orientation affects the amount of solar radiation within the house.

ments and the masonry of buildings tend to store more of the heat from the sun than is given off at night. Trapped inside the buildings, temperatures rise higher with each succeeding day of heat. In open rural areas each day's load of heat is reradiated into outer space at night or absorbed by the vegetation. A factor in night cooling in either situation is orientation to the prevailing breeze. A study of a housing project showed a difference of 13 degrees in rooms on the protected side and on the windward side.[1]

A factor in the heating of houses not always possible to control is the variation of temperatures from floor to ceiling. The temperature regarded as comfortable varies with individuals and depends somewhat upon the extent of physical exertion. The coldest place is near the floor and many heating engineers aim to supply a temperature of 70 degrees F. at knee height. Ordinarily this implies a temperature of 76 degrees F. at five feet and 80 degrees F. at the ceiling height.

Proper illumination is important for safety and the conservation of eyesight. Ideas in regard to standards for this will be developed in a later problem as will the effect of heights of working surfaces.

As to what may be done to change the conditions that contribute so largely to the loss of human life, or the incapacity for effective living, there is much debate. An impetus toward improved housing has been given by the slum clearance program sponsored by government and other agencies. Although we may all desire the eradication of blighted and blighting areas, it may not be amiss to consider the implications of a report made at a meeting of the British Royal Society of Medicine in 1933.[2] A slum population had been transferred to modern dwellings in a healthful area. The new area showed a marked increase in the death rate in spite of better housing conditions. Rents were higher and consequently there was less money to spend for food. Obviously if good environmental conditions are obtained only at the expense of reduction of food-purchasing power far below the safety line, such advantages as result from good housing will be more than outweighed by faulty diet, and lowered resistance to tuberculosis and other diseases will be noted. This is a problem which must be faced in the United States slum clearance program. Improved housing can have the desired effect on health only if it is accompanied by wage increases that make possible the increased expenditures for rent without impoverishing the rest of the household budget, or if the approved quarters are made available at the rental paid for the quarters previously occupied by the tenant.

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[1] American Public Health Association, *Housing for Health,* p. 81. The Science Press Printing Company, Lancaster, 1941.

[2] "Good Housing vs. Good Food," *Monthly Labor Review,* vol. 37, pp. 912–913, 1933.

The "nice problem" in economics involved should not deter us from interest in the ways and means of making available a sanitary, healthful environment. We need to understand the problem from all its various angles and to be able to contribute to its solution.

What, then, can be said of the effect of housing on health? Housing affects the health and well-being of the members of the family and the community. It may conserve good health. Good health should imply more than just avoiding disease; it should imply the best quality of physical soundness, mental vigor, and moral tone. Cold, gloomy, damp, and cheerless rooms, lack of opportunity to take advantage of the healthful qualities of sunshine, bad air caused by poor ventilation, and the irritating dust of untidy homes may depress vitality and contribute to a low resistance toward disease.

The negative results of bad housing are listed by Dr. R. St. J. McDonald,[1] prominent Canadian health authority, as follows:

Bad housing results in:
An increased morbidity rate.
A lessened expectation of life.
An increased general death rate.
An increased pulmonary tuberculosis death rate.
An increased measles, whooping-cough, and diphtheria death rate.
An increased incidence of anemia rate from rickets.
An increased infant mortality rate.
An increased incidence of anemia and rheumatism.

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[1] Florence Domby Shreve, "The Relation Between Housing and Health," *Practical Home Economics*, vol. 16, pp. 45–46, Feb., 1938.

An increased incidence of all the common communicable diseases.

An increased incidence of delinquency.

An increased general deterioration in the health leading to debility and poor physique.

We can thus see that the housing of one becomes the concern of all.

Suggested Activities

1. What are accepted standards for the housing of college students in your college? Explain the health basis for the establishing of each standard.
2. How far can you expect families to go individually in obtaining good housing? What are some of the limiting factors on the success of the individual family in obtaining desired housing facilities for itself?
3. What is meant by room density? What relation does it bear to the spread of communicable disease? To infant mortality? To mental health?
4. What wards in your city have the greatest room densities? What is the situation in regard to toilet facilities in these wards?
5. Take any block in your city and check it for all of the features which might have a negative effect on the health or comfort of the persons living there as set by standards indicated in this problem.

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Problem 5. HOW CAN THE SAFETY OF THE FAMILY BE PRESERVED IN THE HOUSE IN WHICH IT LIVES?

The loss of life and property due to accidents in the home is far greater than is commonly realized. Of the approximately 96,000 accidental deaths occurring in the United States in 1945, 28,600 were due to accidents involving motor vehicles,[1] 16,000 had occupational causes, 14,500 occurred in public (not involving motor vehicles), 7,000 were for military personnel, and 33,500 were from accidents in the home. As is seen, accidental deaths in the home excelled fatalities from all other causes during that year.

A study of the home accident problem requires a knowl-

DEATHS FROM HOME ACCIDENTS, CIVILIANS, BY TYPE AND AGE: 1944 AND 1945[2]

Type of Accident	1945 Totals	1944 Details by Age Group						
		All ages	0–4 years	5–14 years	15–24 years	25–44 years	45–64 years	65 years and over
Total	33,500	32,500	5,850	1,950	1,050	2,000	3,550	18,100
Falls	16,900	16,300	380	170	70	330	1,450	13,900
Burns, explosions	6,300	6,100	1,900	800	270	650	880	1,600
Poisonings (gas excepted)	1,800	1,700	650	70	100	330	350	200
Poisonous gas	1,500	1,300	70	60	110	230	350	480
Mechanical suffocation	1,300	1,400	1,340	20	10	10	10	10
Firearms	1,300	1,100	80	320	280	240	140	40
Other	4,400	4,600	1,430	510	210	210	370	1,870

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[1] These figures were taken from *Accident Facts, 1946 Edition,* National Safety Council, p. 3. Some states reported the number of motor vehicle deaths occurring in work places and on home premises in addition to the public place fatalities. Therefore the total numbers given do not equal 95,000.

[2] *Accident Facts, 1946 Edition,* National Safety Council, p. 78. Source: Approximations by National Safety Council, based on U. S. Census Bureau data.

edge of the types of the accidents and the ages affected as well as the location and objects involved. Perusal of the table on page 82 will give an idea of the types of home accidents and the ages affected by them.

Courtesy National Safety Council, Inc.

Guns should be stored out of reach of children.

From this table it is seen that falls occurring mostly to persons 45 years of age and over heads the list of home accidents, being followed by burns and explosions for the 0–14 years of age and the 45 years of age and over. Mechanical suffocation takes a high toll from 0–4 years of age group as does poisons for this age group and those above 25 years of age. Other types of accidents affect age groups in various ways.

Home accident cases hospitalized at Cook County Hospital were analyzed to determine where accidents had occurred. The table on page 84 shows that the yard, the kitchen, the outside stairs, and the inside stairs lead as hazardous places; with the living room, the porch, and the bedroom being close seconds.

The objects involved in 6,315 home accidents were analyzed by the Metropolitan Life Insurance Co. The results of their analysis are shown on page 85.

The mechanical and personal causes of hospitalized home accidents were studied with results as shown in the table on page 85.

In addition to the losses and inconveniences to persons of home accidents, there is the property loss from fires. In the United States, the National Board of Fire Underwriters estimated that this loss in 1945 was $484,000,000. Home fires de-

Courtesy American Red Cross

All electric outlets in the bathroom should be controlled by a wall switch, out of reach of the bathtub or shower.

LOCATION OF HOME ACCIDENTS [1]

ALL LOCATIONS	4,602	100%
Yard	870	18.9
Kitchen	821	17.9
Outside stairs	593	12.9
Inside stairs	458	10.0
Living room	393	8.5
Porch	333	7.2
Bedroom	329	7.1
Basement	262	5.7
Dining room	143	3.1
Bathroom	126	2.7
Hall	91	2.0
Garage and shed	81	1.8
Elsewhere	102	2.2

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[1] *Accident Facts, 1945 Edition,* National Safety Council, p. 90.

OBJECTS INVOLVED IN 6,315 HOME ACCIDENTS[1]

Object Involved	Per cent	Object Involved	Per cent
All objects	100%	Food	3
Tools and sharp objects	14	Floor coverings	3
Furnishings or equipment	12	Animals, insects, etc.	3
Utensils	7	Flammable liquids and materials	2
Slippery surfaces	6	Other household appliances	1
Heating equipment	5	Structural defects	2
Laundering equipment and materials	5	Firearms	1
Toys and play equipment	4	Automobiles	1
		Other objects	14
		None, or not specified	17

CAUSES OF HOSPITALIZED HOME ACCIDENTS[2]

Mechanical Causes	Per cent	Personal Causes	Per cent
Disorder	18	Poor judgment	24
Improper equipment	10	Child injury—adult fault	10
Improper use of equipment	10	Physical frailty	8
House needed repair	8	Hurry	6
Ice on walk	4	Intoxication	5
Lack of light	4	Physical handicaps	3
Other mechanical	10	Other personal	12
No mechanical factor	36	No personal factor	32
Total	100	Total	100

stroyed property valued at $112,500,000, of which $8,500,000 was in hotel and apartment house fires and the remainder was in private dwellings.

Figures such as these present a distressing picture of the home accident situation, and lead to the conclusion that earnest study and application of preventive measures should be made. It appears that some accidents are due to the condition and manner of construction of the house and its grounds, that others are due to the way the house is used, and that some accidents have other causes. It is pertinent here to give attention to those having the house and its equipment as a major cause of the accident.

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[1] *Accident Facts, 1946 Edition,* National Safety Council, p. 78.

[2] *Accident Facts, 1946 Edition,* National Safety Council, p. 77.

Courtesy National Safety Council, Inc. and Chicago Board of Education

Left, this girl is exposing herself to the possibility of a serious burn. *Right*, this is the correct way to lift a hot teakettle from a stove.

In the house the kitchen is the most dangerous room. Although the greatest dangers come from the use of the cooking equipment and its fuel, falls, cuts, and scratches also take their toll.

Some hazards in connection with the range or stove are:

1. Overheating wood or coal-burning stoves or ranges so that uninsulated nearby floor, walls, or storage cabinets are ignited.
2. Starting a fire in wood or coal-burning stoves or ranges with kerosene.
3. Improper storage of kindling material and other fuel for wood or coal-burning stoves or ranges.
4. Hanging clothes to dry or window curtains too close to a hot stove or an open flame.
5. Installing wall cabinets too close to a hot stove surface or open flame.
6. Improper adjustment or installation of gas or fluid burning stoves or ranges. Vents for gas stoves are recommended.
7. Using large quantities of liquids, especially fat, over heat and setting it off from the heat to cool.
8. Lifting lids of kettles or roasters.
9. Leaving long handles of sauce pans extending over the edge of the stove.

10. Children pulling hot liquids from tables or work surfaces.
11. Improper methods of home canning and use of pressure cooking utensils.

Falls in the kitchen may occur because of these and other causes:

1. Bumpy, uneven, or insecure floor or floor covering.
2. Slipperiness caused by high polish or something spilled on the floor.
3. Frequently used high storage cabinets reached by climbing on insecure supports. Sturdy steps should be provided.
4. Stumbling over articles left on the floor.

Cuts, scratches and bruises may happen because:

1. Cutting and mixing tools are not held and used properly.
2. Sharp corners, doors, cutting boards, and hanging tools protrude into traffic lanes or areas of action.
3. Storage of sharp cutting utensils requires searching for them in a space holding other utensils.
4. Tin cans and bottles are not opened and disposed of properly.

The living room and the dining room are dangerous places. Serious falls and burns also occur here. Falls may come because of:

1. Floors were too highly polished and slippery.
2. Scatter rugs were placed in the traffic lane and were not held down by nonslip material.
3. Toys were left to clutter an area where walking is common.
4. Furniture jutted into traffic lanes.
5. Light switches placed behind furniture groupings were too far removed from usual entrances.
6. Ladder or sturdy stepping stools not used for reaching high objects.
7. Insecurely hung pictures or shelves may fall from the wall causing injury.
8. Some chairs or settees may be too fragile.
9. Extension cords may reach across traffic lanes.

Burns in the living room are caused by:

1. Improper disposal of burning matches and cigar and cigarette stubs.

2. Unscreened fireplace.
3. Poor electrical connections or those in a state of disrepair for lamps, radio, Christmas tree, fan, space heater, or cooking utensils used in the room. Plugs in the wall or floor sockets should be permanently installed.

The bedroom is not as safe a place as it is often thought to be. Fatal as well as minor injuries occur from falls, burns, and suffocations.

Falls in the bedroom occur especially to the old and to young children. They happen because:

1. The passageway from the sides of the bed to the doors may be obstructed or partially obstructed with chairs, open dresser drawers, clothes, or scatter rugs.
2. Light switches may be inaccessible from the bed or the door.
3. Lamp or appliance cords may stretch across a traffic lane.
4. If sewing is done in the room, scissors, pins, needles, or other findings may clutter the traffic lane and cause a fall or other injury.
5. Infants and young children fall out of unguarded beds or windows.

Injury in a bedroom from burns may come from these causes:

1. Carelessness with matches and cigarettes.
2. Improper use of an electric heating pad, i.e., using it with dampness or going to sleep with it turned on.
3. Leaving an electric space heater turned on while sleeping. Any small aberration of the reflector can focus the heat to ignite curtains or other textiles.
4. Any light source using an open flame—gas, candles, or kerosene—being insecurely located.
5. No escape provided in case of a burning building.

Suffocation to infants and young children come from heavy bed covers, too many pillows in the crib, or from the child rolling too near an adult in the same bed.

The bathroom is not the most hazardous room in the house, but it has its share of serious injuries, involving falls, burns, and poisoning.

Falls in the bathroom mostly occur in or in the area of the bathtub. They are due to:

1. Slipperiness of the tub where soapy water has been, and the difficulty of rising from a flat sitting position. Nonslip mats for the bottom of the tub, or an arrangement for a sitz bath, and a strong grab bar installed in a convenient place are recommended.
2. Windows located over the tub are difficult to reach for opening, or closing, and washing. Falls may occur because of the difficulty of getting a secure footing.
3. The floor of showers may be slippery as is also the floor of the room if water is spilled.

Injuries from burns and electrical shocks may come because:

1. There is no mixing faucet or it fails to operate properly. The hot-water heater may be set for too high a temperature.
2. A child may turn on the hot water only and then fall into it.
3. A bare heat pipe may be so near one of the fixtures as to necessitate touching it.
4. It may be possible to touch an electric switch to the light or an appliance and a faucet or fixture at the same time. The electric light switch should be near the door, and any pull-cords should have an insulating link.

Poisonings occur in the bathroom because poison containers stored there are not clearly marked. These include germicides, antiseptics, insecticides, household cleaners, and certain medicines, all of which are harmless when used properly. In the dark they may be mistaken for medicine, or curious children may put them in their mouths. There has been some suggestion that a separate locked cabinet be supplied for all poisons.

Safeguarding the activities of the basement or utility room is an important and complicated task. Many of the fires in homes have their inception there, and the more hazardous household equipment, such as washers, ironers, and tools of the workshop are located there.

Fires may start there because:

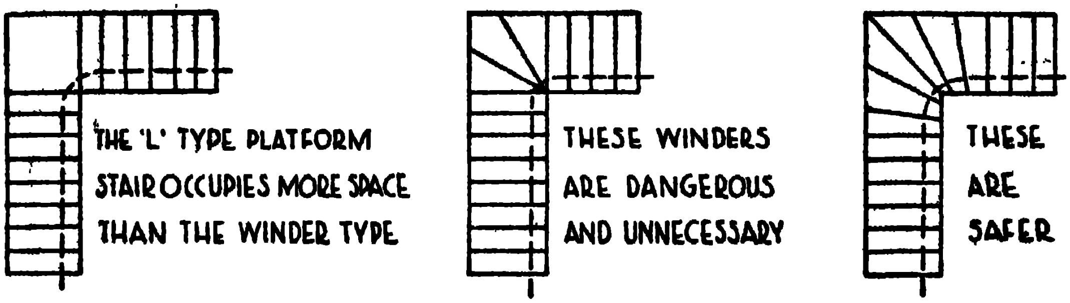
Courtesy National Safety Council, Inc.

Fire may start in loosely stored trash.

1. Coal or wood-burning furnaces may not be properly insulated to prevent overheating nearby walls, partitions, or floor.
2. Flues and heat ducts may be defective or clogged with inflammable material.
3. Hot ashes are placed in combustible containers.
4. Improper methods may be employed to start the fires and store the kindling.
5. Trash may accumulate along with oily rags and materials possible to start spontaneous combustion.
6. Short circuits from defective wiring may occur.

Accidents from laundry or workshop machinery may occur because:

1. Porcelain outlets and switches have not replaced the common brass ones.
2. The floor may be damp, thus effectually grounding anyone touching a defective electrical appliance. Stand on a rubber mat or other insulating material.
3. Poor design and careless use of power wringers and ironers.
4. Gears, belts, and saws in the home workshop may be unguarded.


THE 'L' TYPE PLATFORM STAIR OCCUPIES MORE SPACE THAN THE WINDER TYPE
THESE WINDERS ARE DANGEROUS AND UNNECESSARY
THESE ARE SAFER

There are three plans of stairways shown here. *Left,* if a stairway makes a turn a platform is the safest arrangement. *Right,* if winders are necessary because of lack of space this arrangement is safer than the arrangement shown in the center.

5. There is not ample headroom in areas of activity or storage. Shelves may be too high or insecure.

Halls and stairways are exceedingly hazardous. Falls are probably the most common accident there. Some falls occur because of the manner in which the stairs are constructed. To make them safe and easy to use certain standards have been developed. These include:

1. The slope should be between 30 and 36 degrees.
2. The risers should be 7 or 7½ inches high, and the treads should be 10 or 11 inches wide.
3. Doors at the top or bottom should be glass paneled with a landing of at least 30 inches wide on the stair side.
4. Ample headroom at all points is important.
5. Every flight should have a handrail and be lighted. The light should be controlled by a two-way switch, one at the top, the other at the bottom of the flight. Paint the bottom step white.
6. Stairs requiring a turn are safest if there is a landing at the turn. If space does not permit this, the steps should not be perfect wedges, but partial wedges should begin before the turn starts.
7. Any carpeting or pads on the steps should be securely fastened.
8. The steps should be in repair at all times.

Other falls or bumps are caused by unsafe practices:

1. Leaving things on the steps.
2. Carrying too heavy a load up or down stairs.
3. Using scatter rugs at the top or bottom of a flight of stairs.

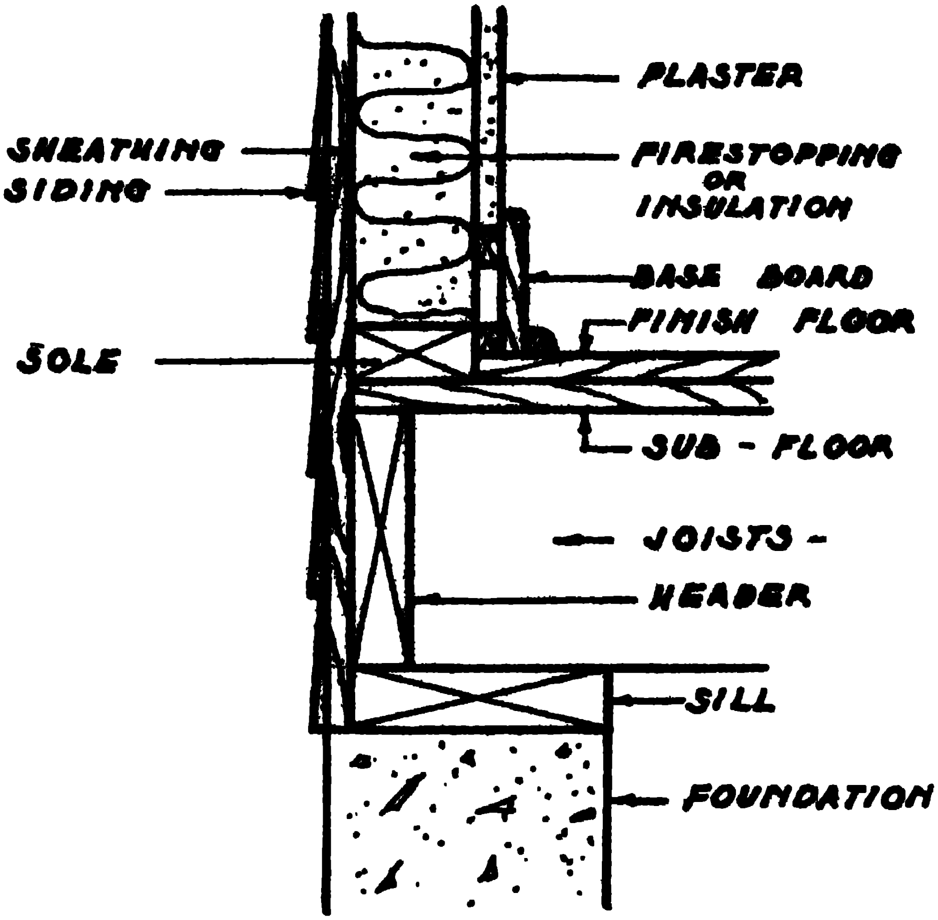
Courtesy American Red Cross

Poor housekeeping is the cause of many falls.

4. Placing storage equipment as chests or cabinets so that they block easy passage.
5. Storing cleaning and other equipment loosely along the stairway.
6. Placing a telephone at the top or bottom of the stairs.
7. Opening doors along a hallway into the halls rather than into the room.

Not all the accidents which occur at home take place within the house itself, but the porch, the yard, and the garage contribute their full share. In the garage, carbon monoxide gas is the outstanding hazard. It is odorless and thus is not detected. The garage door should be opened before the engine is started. Other hazards occur because:

1. Steps and walks are out of repair.
2. Snow and ice collect on steps or walks.



Noncombustible insulation material used in the walls of a house assists in making the house fire-resistant.

3. Garden tools and hose are not properly stored.
4. Ladders are not used properly.
5. The clothesline is located in a line of traffic.
6. Garden pools and bird baths are not properly guarded.
7. Trash and rubbish accumulate or are not burned in a safe incinerator.

In building, reconditioning, or remodeling, due regard should be given to the hazards of fire and to methods of fire prevention.

Fire resistance in a building is increased by the incorporation of structural features that will prevent the origin and rapid spread of fire. This may be accomplished by building exterior walls, floors, roofs, and interior partitions of noncombustible material. To this extent fire resistance is independent of the human element on which fire prevention efforts along other lines must depend.

More fully fire-resistive interior construction for dwellings can be obtained in several forms including for floors various kinds of light steel-protected framing, hollow clay or gypsum tile between reinforced concrete slabs and beams. Nonbearing partitions can be of steel studs covered with plaster on plaster board or on metal or wire lath, of hollow clay tile, gypsum, or concrete blocks. Load-bearing partitions can be of heavy steel studs protected by plaster on metal or wire lath, or of suitable thickness of hollow clay tile, concrete block, poured concrete, or brick. Gypsum plaster is effective, as high temperatures do not penetrate it readily and it clings even during fire exposure. In case the finish is such that the walls and ceilings are moderately protected against fire attack, the fire may still burn through the wood floors and spread into hollow spaces back of the finish. For this reason, fire-stopping is particularly desirable.

If walls and partitions are made from combustible materials, and the structure is such as to allow hollow spaces between studs and joists, the spread of fire can be retarded by closing the hollow spaces at the floor, the wall, and the roof lines. Such closing is termed fire-stopping. Well-fitted boards are sometimes used for this purpose but incombustible filling is better. This filling should completely occupy the hollow space between floor joists and studs to a height of 3 to 4 inches. Board stops at the mid-height of walls and partitions are also desirable. Incombustible materials suitable for fire-stopping include cinders, ashes, refuse mortar, plaster, concrete, hollow tile, brick, gypsum block, and mineral wool. It should be noted that many of these materials are also satisfactory for heat insulation. When so used the material completely fills the cavity. Fire-stopping increases initial expense in construction but is a highly desirable practice.

From the standpoint of structure, most common points from which fires have their origin include defective chimneys and flues, sparks on the roof, and defective or overheated stoves, furnaces, boilers, and their pipes. Chimneys should be built with two purposes in mind: to protect the structure from fire hazards and to dispose efficiently of smoke and fumes from the heating plant.

New chimneys should always be tested for tightness before they are used, and old chimneys should be tested occasionally. The test consists in building a small fire of material which produces a considerable volume of smoke. A cover is then put over the chimney at the top and all parts of the chimney walls are examined for evidence of the escape of smoke through them.

The roof of a house is frequently subjected to sparks from its own chimney, and may be called upon to withstand brands from burning buildings in case of fire nearby. Slate, clay and concrete tile, cement-asbestos, metal sheets and metal shingles at present compose the noncombustible types of roofing. These have sufficient fire resistance to prevent the ignition of the boards supporting them. The protection afforded by the thinner roofing can be increased by a lining of asbestos felt placed between the roofing and the roof sheathing. Wood shingles catch fire easily from brands, and when burning give off flying brands that may set other fires.

As the home accident problem has become one of major importance in our country, definite activities leading to education for safety are needed. Safety education should be furthered for two reasons: First, the safety and convenience of design and equipment of a home will decrease by only a small percentage the number of accidents if the occupants persist in unsafe habits and practices; second, better design and equipment will be provided and maintained only in so far as the general public has been educated to desire and demand them.

The schools have been effective agencies for decreasing accidents through the instruction of children. Similar education for adults is being advanced by some of the organizations which have self-education as one of their objectives.

Local organizations generally interested in home safety include the chambers of commerce, service clubs, women's organizations, parent-teacher associations, citizen associations, the Press Association, the Young Men's Christian Association, the Young Women's Christian Association, the Boy Scouts and Girl Scouts, 4-H clubs, the Farm Bureau, religious and fraternal bodies, police and health departments, and perhaps others. Such bodies or groups of bodies can accomplish these things:

1. Check on the accident experience of its own members and see that the members of the group understand both the need for and the methods of avoiding accidents to themselves and their families.
2. Encourage the giving of adequate instruction on safety in the local schools.
3. Support and initiate better laws, and better enforcement of laws dealing with home safety. Participate in a general community educational campaign.

National agencies sponsoring home safety education include:

National Fire Protection Association
National Bureau of Casualty and Surety Underwriters
National Safety Council
National Board of Fire Underwriters of New York

Local or state-wide legislation, the adequate enforcement of which would do much to reduce hazards, include the following:[1]

1. *Building Code.* Such a code should cover the necessary limitations for securing adequate strength in buildings and adequate lack of combustibility along with other provisions for the safety, health, and welfare of the occupants, such as sanitation, provision of adequate light and ventilation, etc. Such codes are already common, being in some instances of state-wide application and others municipal. . . .
2. *Fire-Prevention Code.* The fire-prevention code is especially valuable in cities in controlling fire hazards. It should preferably contain only the fundamental principles of fire prevention, leaving to the enforcing authority the promulgation of regulations covering details which will probably need changing from time to time. Such an enforcing authority should be

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[1] President's Conference on Home Building and Home Ownership, *Housing and the Community,* vol. 8, pp. 84–85. President's Conference on Home Building and Home Ownership, Washington, D. C., 1932.

set up preferably through a fire prevention bureau in the municipal fire department. Such a municipal ordinance should cover such items as explosives, inflammable liquids, pyroxylin plastics, X ray, photographic and motion-picture films, fireworks, paints, varnishes and lacquers, hazardous chemicals, refrigeration equipment, etc.

3. *Arson Law.* Such a law is intended, by fixing adequate penalties, to control incendiary fires. Such laws already exist in more than half of the states.
4. *Individual-Liability Law.* This may be a separate law or may be included in a fire-prevention ordinance. It is intended not only to emphasize the personal responsibility for carelessness through common-law liability, but to assess against those found to be responsible for fire the cost of extinguishing or attempting to extinguish such fires. The conviction is growing that much greater progress can be made in checking a fire waste if the person who has a fire is looked upon as a public offender rather than an unfortunate.

Observance of these suggestions should reduce hazards in any community.

Suggested Activities

1. Develop a check list for common safety hazards in the home or investigate one developed by an approved agency. Use it to check a home for possible safety hazards. What could be done to eliminate the hazards found? What costs are involved?
2. What suggestions for safety of their property should be made to persons closing their house for a period of weeks or months?
3. What safety hazards of infants and young children have you observed?
4. What hazards of the aged have you observed?
5. What special safety problems do those who live in rural areas have?
6. Keep a scrap book for a few months of the fatal and nonfatal home accidents reported in a group of available newspapers. Analyze them as to causes which are preventable. Make recommendations as to safe practices to follow.
7. List the fatal or nonfatal home accidents that have occurred in your family. How much time was lost? What costs were involved? What caused the accident? How could it have been prevented?

8. What property damage did fire cause in your state and your community last year? What causes are given for the fires?
9. What organizations in your community could be interested in sponsoring a home safety program? If you were to assist in that program what suggestions would you make to develop the program?

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National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

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Problem 6. WHAT PROVISION SHALL BE MADE IN THE HOUSE FOR THE FAMILY WITH CHILDREN?

The child is dependent upon the home for continuity of security, affections, intimacies, and loyalties by which his richest growth is consummated. These important values are supplied by family life and cannot be delegated to outside agencies. The mechanism of the house should contribute toward their fulfillment and not toward their frustration. If the house does not provide opportunities for happy family life, then the children seek substitutes for family love. Lack of appreciation of the younger members may send them to the streets or to the public recreation center. Flat denial of the use of certain rooms for certain purposes, or a distaste for the decorations or furnishings, may start an antagonism toward the home which may end in distrust for all family enterprises.

The home is the environment in which the child spends the greater part of his formative years. It is easy to crowd out the child's interests and to restrict or confine his activities by the limiting force of an adult environment. This may be partly due to economic and social factors causing an enforced shrinkage of living space and an increased ratio of adults to children. A stronger cause is the lack of realization of the child's developmental needs.

The home should provide for the whole of the child's life: sleep, privacy, formation of habits, play, work, and their pleasures and satisfactions. Parents should find in it facilities that make easy daily routine activities, provisions for developing desirable habits within the child, and ample and adequate means for safeguarding the child and themselves. It is important to remember that children develop rapidly, that

PERIODS OF A CHILD'S LIFE REQUIRING CERTAIN HOUSING NEEDS

Period of Life	Characteristics	Housing and Furnishing Needs
Infancy	Develops from complete bodily helplessness to such muscular co-ordinations as creeping, pulling up to and standing by a stationary object, holding a cup in his hands while he drinks, and grasping or pulling objects of interest. Requires attention to supply his special needs for food elimination, sleep, and cleanliness of his person and clothes. Develops some emotional, social, and physical habits. Likes to play with many small things at a time and likes to pick them up and drop them.	Infant food preparation center in kitchen with facilities for sterilizing equipment. Comfortable bed in a quiet, cool room, or porch. Space for the mother to feed child, sitting or reclining. Bathing center adequately equipped at a comfortable height for mother, in a warm temperature. Adequate storage of clothes both clean and soiled. Facilities to launder daily at home or at appropriate times in commercial laundry. Space to take sun baths. Warm floor or space for play pen both near family activities and withdrawn so that he can be alone. Clean dry space to learn to creep and walk. Space for him to enjoy the family and be enjoyed. Attractive, sturdy grasp and hug toys, free from sharp corners and harmful points. Possible to wash. Space in the kitchen for child to watch operations.
Pre-school child, ages 2, 3, and 4	Marked development of muscular and body control as demonstrated in running, jumping, and climbing, learning self-care and other skills. Enormous sensory and mental development as shown in use of language, verbal comprehension, form discrimination, imagination. Characteristic emotional reactions being immediate in expression and involving the whole body, overwhelmingly intense while they last and having short duration. Important period for habit training for eating, resting, and sleeping, dressing himself, and attending to toilet needs.	Clean, dry spaces on floor and out of doors to run, kick, yell, and operate pull toys. Safe places to climb. Safe matching and pounding toys with accessible storage. Places to play in water. Place to store tricycle and pull toys. Place to leave floor play projects undisturbed. Facilities for toilet training, both at stool and lavatory. Adequate facilities for learning to eat properly and at regular times. Low hooks for hanging own clothes. Own sleeping quarters or shared with another child. Place in the kitchen for child to imitate the work being done.

PERIODS OF A CHILD'S LIFE REQUIRING CERTAIN HOUSING NEEDS (*Continued*)

Period of Life	Characteristics	Housing and Furnishing Needs
Pre-school child, ages 2, 3, and 4	Play develops from pulling open door and drawers and taking things out and putting them back again, through modeling clay and making sand box arrangements, to pitching a ball, building intricate block houses, and making up games with other children. Likes to imitate adults and other children.	
Primary school child, ages 5, 6, and 7	Has developed physically so that he can take care of himself in eating and dressing, and can manage toys and utensils requiring some skill. Beginning of the dramatic and creative age. Interested in developing manipulative ability. Reads, writes, draws, and cuts out pictures. Runs, jumps, and climbs.	Place for own toilet articles and clothes. Place for toys and properties for the "playlike" activities. Place to make things, depending on the interest. Adequate light at a table and chair of proper height in a warm room. Place for active play both inside and outside. Provision for assisting with the work of the household.
School child, ages 8 to 12	Each sex are apt to play by themselves. Hobbies are important. Clubs, cliques, and study groups claim time and attention. Drama and creative play continues, may read a great deal. Games and interests in physical activities are uppermost. Likes to dig, climb, jump, and run. May be indifferent or antagonistic to personal appearance.	Place for groups to play, both inside and outside. Place for collections. Place to read, draw and paint, and store books and art materials. Place to put on shows. Good place to groom themselves. Convenient places to store belongings. Place to store bicycles and sports goods. Place for "live" hobbies. Facilities to serve substantial foods and care for his clothes. Provision for developing money-making projects when desired.
Adolescent child, ages 13 to 17	Growth is rapid and each sex goes through an awkward period. Interest in the opposite sex appears and predominates during these ages. Increased interest in personal appearance shown through	Place for girls to entertain boys alone. Attractive but sturdy place for groups to dance, play games, and have snacks. Both boys and girls are interested in developing own rooms without adult supervision.

PERIODS OF A CHILD'S LIFE REQUIRING CERTAIN HOUSING NEEDS (*Continued*)

PERIOD OF LIFE	CHARACTERISTICS	HOUSING AND FURNISHING NEEDS
Adolescent child, ages 13 to 17	primping, and obtaining and exchanging articles of clothing. Hobbies are apt to be collecting various things. Recreation is active and may be boisterous, imitating an age older than themselves. Desire to be separated from adults. Clubs, cliques, and other interests take much of time. Interest in house furnishings increases.	Place for collecting or developing hobbies in privacy. Place to groom without interference from other members of the family. More attractive home furnishings often demanded by girls. Place to read and write.
Young adult	Growth is completed. Interest between the sexes continues. Search for an occupation or career is made. May leave home for further education or employment, returning at intervals.	Place for girls to entertain boys in privacy. Facilities for dressing and grooming quickly or leisurely. Place to store unused personal articles and clothing when not at home.

each phase of their life is characterized by certain activities of the child itself and by special requirements for its care, and that adaptations in the use made of rooms and changes in some furnishings and equipment are necessary from time to time as the child develops.

What is desired in a house by a family with children to meet these changing needs? A living room for family and friendly gatherings, a kitchen for food preparation and clearing, a dining area, enough bedrooms so there is one for each two children of the same sex, and a bathroom convenient both to the bedrooms and the work area are the first requisites. In addition, surveys show that a dining room is desired as well as a place to eat in the kitchen. A dual-purpose room, the function of which varies as the family pattern changes, is also desired. At first this room may be a nursery or a play room, then a place to study, and later it may be used as a den or a second living room either by the parents or the children when they entertain separately. At times it may serve as a sick room or an extra sleeping room. Most families want a place to do the laundry. Opinion is divided as to whether this should be a special utility room on the first floor or in the basement, or as a part of the kitchen or the garage. Many would desire an extra lavatory and toilet placed either on the first floor or in the basement. Many request porches either at the back, the side, or the front, while others insist on an airing deck. Although many prefer a one-story house, economy may require that a one-and-a-half or two-story house be erected.

Any house used by a family with children should express the principles of good house planning. Circulation to permit children to reach the bathroom, the coat closet, and the kitchen from playroom and play yard is especially desirable. It is necessary, also, that the use made of rooms, and the furnishing, must be adapted to the needs of the family at the time of its use.

Equally as important as the features provided by the house for the child, is the consideration of the furnishings and equipment that may help the parents in the care of children. The choice of finishes, furniture, and equipment throughout the house exerts an important influence both on the development of children of all ages and on the ease of their care. Walls, ceilings, and floors form the background of the rooms, and they should be attractive and should harmonize in color and texture with the furnishings of the rooms. The walls should be of hard finish, and both walls and floors should be smooth, durable, and easily cleaned.

In rooms used by small children, the floor must be warm and its finish such that it can be easily cleaned with soap and water. A rug or several rugs which may be taken down and spread as mats to sit on afford a means of securing desired warmth. The floor should not be slippery. Care should be taken to avoid small scatter rugs that are conducive to stumbling. Curtains should be simple in style, of materials readily cleaned, and substantially hung. Upon the walls a few carefully chosen pictures which can be changed frequently are preferable to the nursery rhyme wallpapers often shown in pictures of rooms for children. The furniture and equipment should be selected and arranged for durability, effectiveness, comfort, and convenience. Furniture should be chosen that does not warp, shrink, swell, or splinter and that does not require frequent refinishing. It should be free from sharp corners that might be injurious to a stumbling child. The upholstering, if any, should be of a good quality and of such a character that its care should not be time consuming. Both furniture and equipment should be grouped according to use.

Despite the emphasis on use, it must be understood that beauty is not to be displaced by utility; for appreciation of lovely things can and should be developed in the child at an early age. Each object should be of sufficient interest to warrant the money expended on it, the space occupied, and the care necessary. Valuable breakable objects should be kept out of the reach of the child, even if this necessitates storing during the time of infancy.

Although children can be taught to respect and use carefully the things about them, it is probably easier for all if furniture is chosen which does not scratch, soil, or wear out easily. The mother who aims at serenity is in a difficult situation if she holds to a prechildren standard of perfection in the appointments of her home.

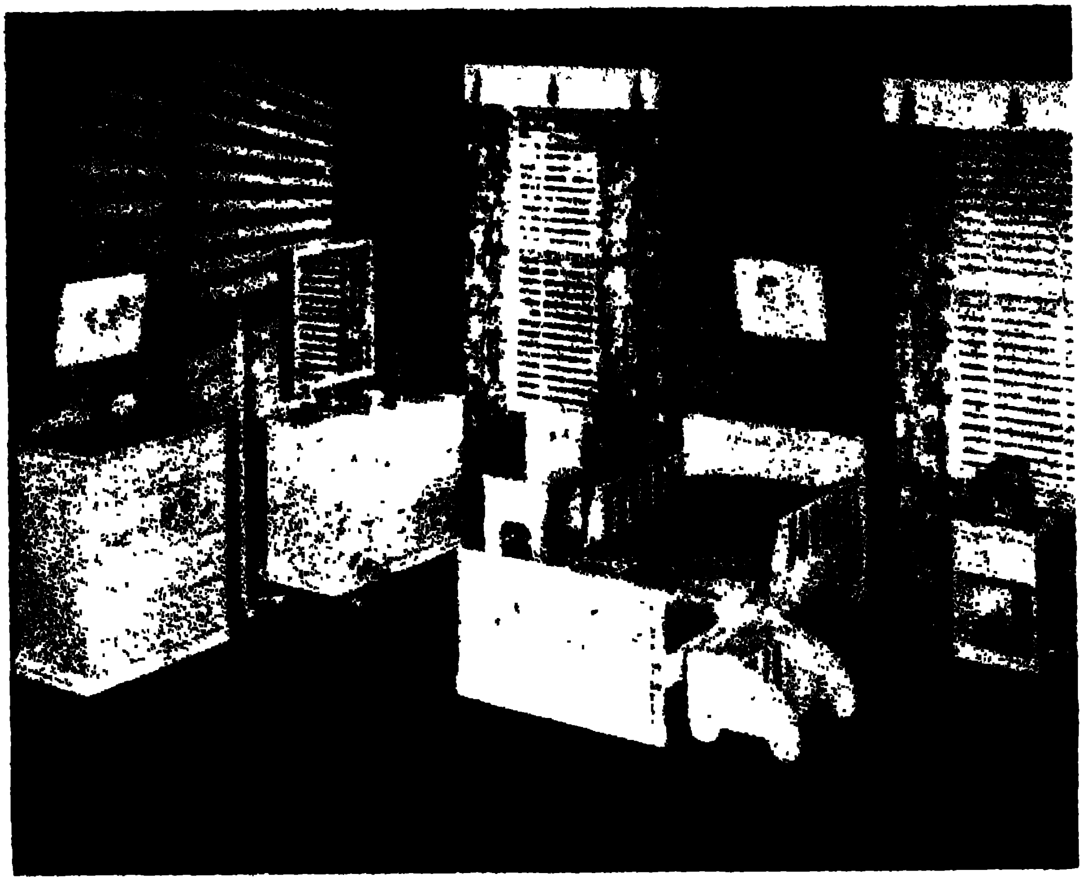
The furniture which the child is to use should be suited to him in size and proportion, but at the same time should make provision for his normal growth. It should be sturdy enough to stand hard usage, heavy enough to prevent tipping, and yet be light enough to be moved about by the child. It should have rounded corners and smooth edges. The living room should have at least one chair to fit each small child, even though play space is provided elsewhere. As the child reaches school age, a convenient place for reading, with a good light, should be provided. Needs for his later development include books, games, and music, all of which may be employed to encourage participation in family recreation.

Special furniture and eating equipment to suit children of various ages and sizes must be provided in the dining room if the child is to share the family meal hours. In such case as soon as the baby can sit alone he needs a high chair with a footrest, an attached food shelf with a removable tray, and legs spreading to a broad base for safety from tipping. Later, when he begins to eat solid and semisolid food, he needs a curving handled spoon with a round bowl, an unbreakable cup with rounded edges, broad base, and easily grasped handle, and a dish with protected sides from which he can eventually feed himself. The dishes chosen for any age should be appealing in design and color, but not so elaborate that they distract attention from eating. During childhood a youth chair with an adjustable footrest makes it possible for the child to eat comfortably at the family table.

Many families prefer that the child eat by himself at a low table with a special low chair which is so sturdily built that it does not tip. The table should be just high enough so that his elbows will be level with the top when he is seated on a chair with his feet resting on the floor. Decision as to what equipment shall be chosen is a matter for the individual family. As the child grows older he can eat a greater variety of foods, and his ability to feed himself has developed to the extent that he may be included at the family table. By the time he reaches school age his eating habits are likely to be patterned after those of adults, and hence he would need very little special consideration in this regard.

In the kitchen, special equipment and a definite place to keep it should be provided for the preparation of the infant's food and for sterilizing equipment for feeding. If he is bottle-fed a metal grip for removing sterilized utensils from the boiling bath, or a special electric sterilizer and a special container for the formula are needed. For the latter part of infancy, measuring spoons and cups, a funnel, sieves of varying degrees of coarseness, a food grinder, and a double boiler are essential.

Early in life a child should have a bedroom of his own or one shared with another child. After the age of a year and a half it is recommended that no child share a grown person's room; such sharing of a room by young and old tends to cause dependency on the part of the child.



Courtesy Lullabye Furniture Corp.

Children like to help themselves to bed if arrangements make it possible.

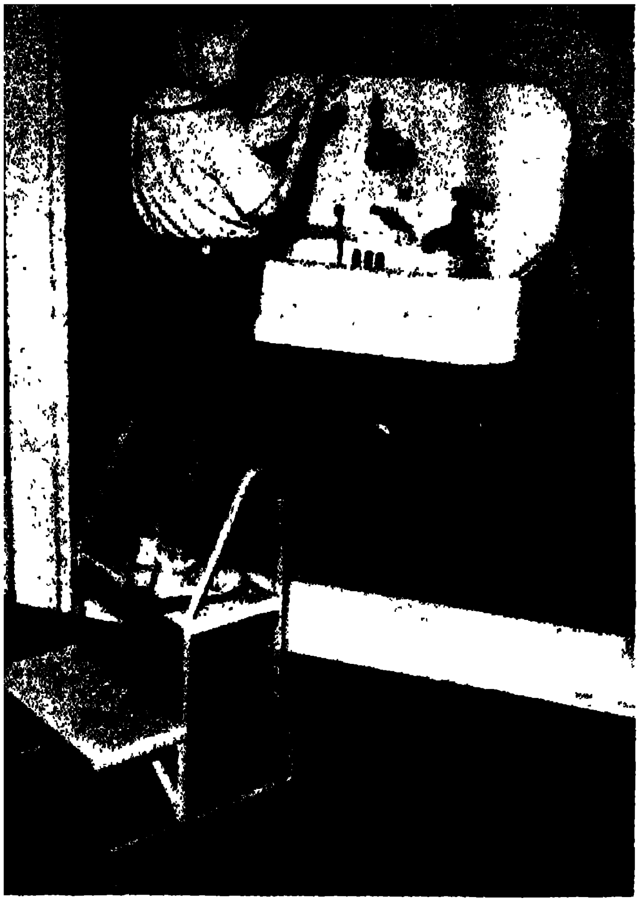
Provision of a bed for each child will insure more restful sleep with its consequent beneficial effect on health. For a young child, a crib with high, sliding sides that will prevent him from falling out is a wise choice. The sleeping height should be such that the mother is not compelled to stoop unduly when lifting the child into or out of bed. Later, small steps, or a sturdy little chair will aid the child to crawl in and out by himself.

The springs and mattresses should be firm and flat, preventing the throwing of the body into a sagging position. A hair or felt mattress at least three inches thick is advised as it does not lump or absorb odors. A flat pillow may be used, but under two years of age the baby is better off with none. The head of the child as compared with an adult is large for its body, and a thick pillow will alter the vertebral line and increase muscular tension in the neck. Necessary bedding includes sheets, protective rubber sheeting, quilted pads, and light, warm covers of a size which permits tucking in well at the sides and foot without restricting the child's movements. At all times there should be ample room on the crib or bed for the child to stretch out at full length. This means that the crib should be replaced with a bed when it becomes too short for the child.

Other conditions which promote restful sleep include temperature which should be cool, but not cold; good circulation of air, but no drafts; darkness and quietness. Restful sleep can be assured only if there are no loud noises. A closed door to the bedroom where the child is resting will prevent distractions and protect him from the ordinary noises of the household.

The bathroom needs of children require special consideration. During infancy the child is usually bathed daily, and his clothes are changed often. Various arrangements for bathing are possible, from a basin to a special bathinette. The latter usually has pockets or other facilities for storing the accessories needed, and any arrangement will be more convenient if these things are centered in one place. A table of suitable height equipped with drawers and pockets to hold the necessary supplies and equipment is satisfactory. A warm temperature is essential for these operations. Young children are usually bathed in the family bathtub. A convenient low chair should be supplied for the person who gives the bath. Children should have a low mirror, a low towel and wash cloth rod, and a toothbrush hook as soon as they can recognize their own things.

Toilet training may be prolonged over an extended period so the necessary equipment for comfort should be present. Until the child is strong enough to sit up, a small chamber should be provided on which he can be supported in the mother's lap. Later a small seat with firm back support to be placed on top of the ordinary toilet should be provided. A toilet seat built for adults is too large for children, and their attention is diverted from their elimination needs by the insecurity of their position. Later in childhood small steps,



Courtesy The Toidey Company

Children learn to help themselves when given proper aids.

stools, or boxes are an aid in climbing onto the toilet seat as well as raising the child to the proper level to wash his hands in the lavatory.

Some families with small children use the bathroom as a dressing room, especially if the sleeping rooms are kept cool. In such case low hooks for overnight hanging of the day clothes should be provided. In any case, the temperature of the bathroom should always be kept warm so that associations of discomfort in dressing and toilet activities may be prevented.

Bathroom walls and floors should be of a finish easily cared for as should all the other equipment. Storage cupboards, preferably built-in, for toilet requisites should be conveniently located. The medicine cabinet must be out of reach of the children and securely locked.

Physical play is an outgrowth of the great human drive and urge for activity. It begins with the first movements of the newborn babe and ends only at death. A whole gamut of play activities from shaking a rattle and rolling a ball to participating in complicated sports and manipulating materials for intricate crafts have been invented by children and adults. Sometimes the play urge expresses itself in some dramatic interest as when young children play house, fireman, or war. This interest manifests itself later in pantomimes, charades, pageants, and in the enjoyment both in participation and appreciation of other dramatic presentations. The play activities which center around music are valuable because music enlists the whole personality and often serves as a release for emotional and mental tension.

Much play activity has a social interest. Children like to be together and take a special satisfaction in being with a selected group. It is this interest that leads to the formation of gangs, teams, and cliques among both boys and girls. This tendency begins to be powerful at about 11 or 12 years of age. The desire to create and build leads to an interest in making things with the hands. Beginning with mud pies there is no end to the variety and intricacies to which this interest may lead. Another interest out of which grow many forms of play is that of acquiring knowledge of the environment. Children have an insistent curiosity, and opportunities should be given to satisfy it. This greed to explore may exhibit itself as early as nine months of age.

Play then is the activity by which a child learns. It is to him a serious activity. He experiments, tries himself out, and explores with interest the world about him. It brings new experiences and new combinations of old experiences. A child's play develops as his age advances, hence his abilities and interests change from time to time. Co-ordination of muscles, information, and exercise of the imagination, all of which are largely prompted by imitation, are the main assets of the play activity. If this activity is thwarted the child's talents as a worker may be stunted and his energies may be turned into undesirable channels. Thus it is most necessary that desirable play space, both inside and outside the dwelling, be provided.

The whole matter of providing facilities for the play of children may be summed up by answers to the following questions:

1. What are the child's play needs?
2. At what stage in the child's development does each need appear and how long does the stage last?
3. What play equipment is desirable for each stage?
4. What housing arrangements constitute an ideal setting for child play?
5. How can the demands of the child for play and of the adult for orderliness and quiet be reconciled?
6. What values may come from a compromise in demands?

Indoor play space is best provided by a room or a fenced-off portion in which the young child can play freely and handle and touch everything within his reach. This area should be easy for the mother or her helper to watch over. Many families prefer the dual-purpose room mentioned earlier. Some find that the use of a dining room for child's play is satisfactory. Others use the basement, the attic, or a loft over the garage for some of the children's play. Decision as to what room should be used seems to vary with urban and rural residence and with the income level. It should be remembered, however, that normal children play a part of the time at any place where the family is gathered. Also, the child's demand for attention and supervision may require play space near the work center of the mother and may necessitate windows between the kitchen and outside play space. Play for the child may be merely watching some interesting activities outside. Adequate provision throughout the house of windows with sills low enough for children to see out is important.

The use of the whole house as play space diminishes with income increase. Play in bedrooms increases with income increase, probably because children in the higher-income levels have their own bedrooms. Special rooms, usually in attics or cellars set apart as playrooms, are most often found in the group with annual incomes of $6,000 or more.[1] At any rate, some space must be provided inside the house where the child can engage in both active play and in the more quiet but constructive activities, such as cutting paper, drawing, manipulating toys, and reading. A workshop with a bench, a vise, and tools for carpentry is desirable in homes where there are boys. It is convenient to have a toilet and wash facilities directly adjoining the playroom, or easily accessible to it.

Outdoor play space which is safe, adequate, and easily

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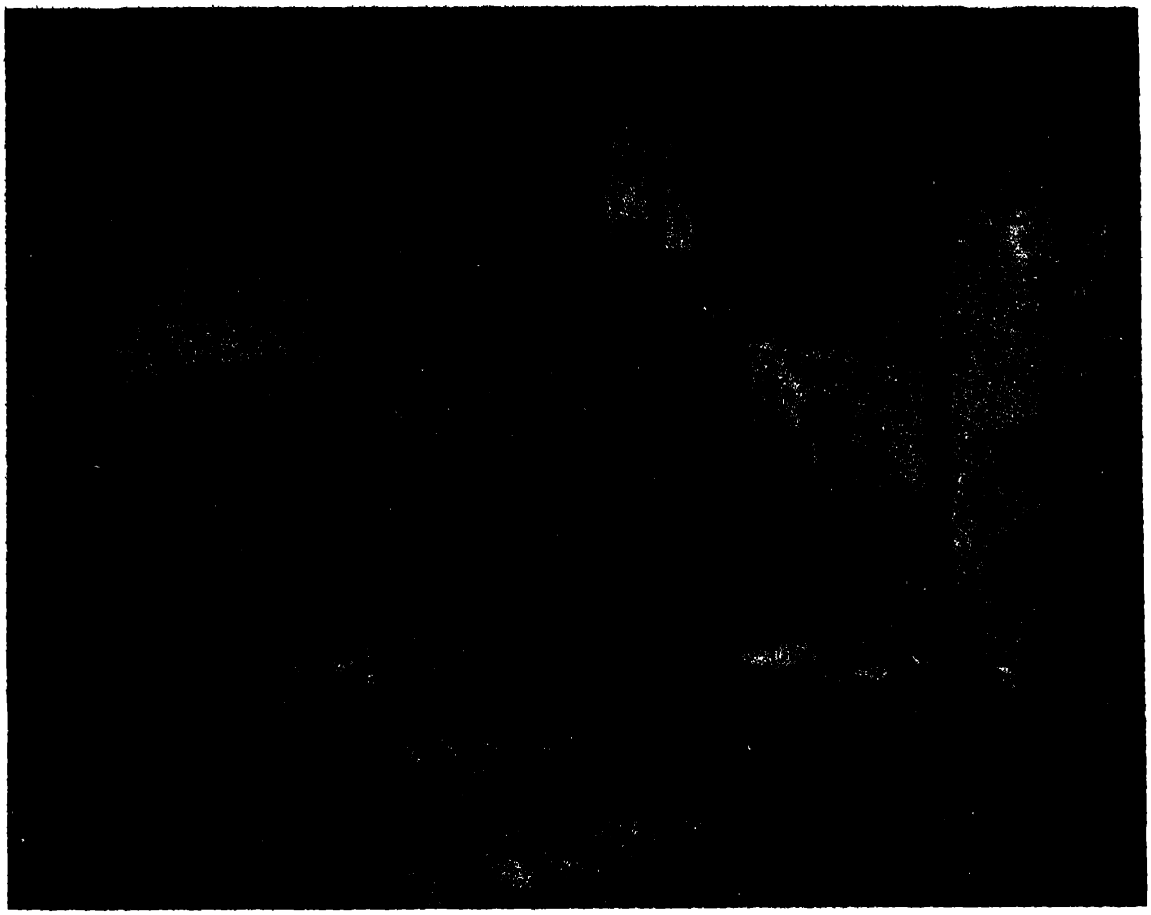
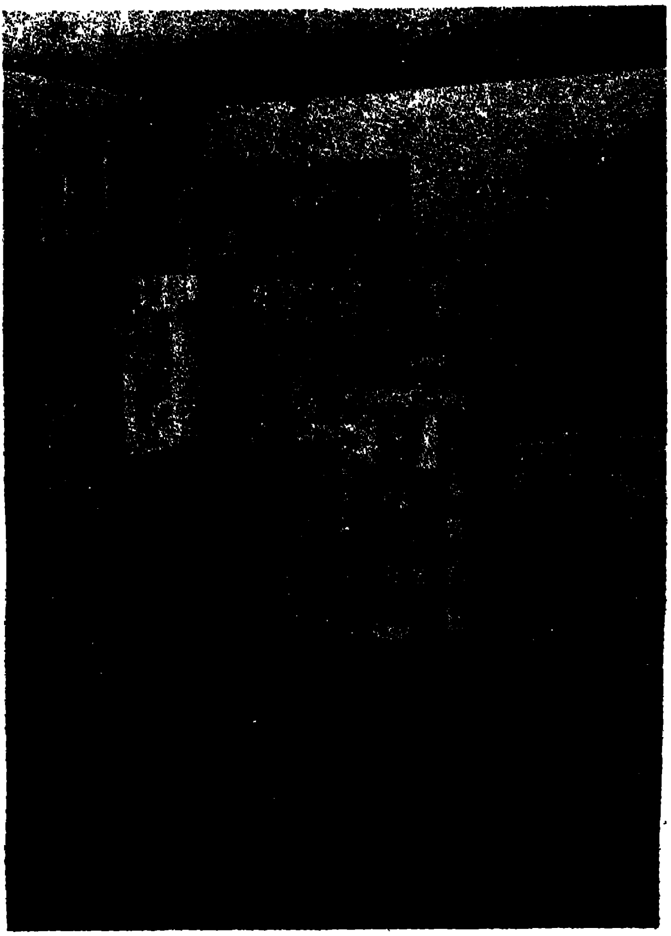
[1] President's Conference on Home Building and Home Ownership, *Homemaking, Home Furnishing and Information Services*, vol. 10, p. 29. President's Conference on Home Building and Home Ownership, Washington, D. C., 1932.





Photograph by the Makers of Armstrong's Linoleum

A play pen may be provided for in the kitchen.

watched over is a great satisfaction to the mother. A child needs to walk and to run, to climb, to swing, to ride, to pull, to push, to dig, and to have his interests always widening. There is need in this outdoor play space for simple, sturdy, safe play apparatus on which the child can do these things. Under urban conditions the requirement for outside space has been defined in terms of from three to five acres of park and play spaces per 1,000 persons, in addition to more distant regional park areas.

The Committee on the Infant and Preschool Child reporting to the White House Conference found "Families of the higher socio-economic classes live in better neighborhoods, and in larger and less crowded homes. The homes are more completely equipped with modern appliances, books, toys, and play apparatus, than is the case with homes of the lower groupings." [1] In the same report it is shown that frequency of playgrounds for children increased as one moved from the lowest income level, perhaps living in slums, and the highest income level, perhaps living in apartments, toward the median representing the middle-class family. However, of the 2,703 families reporting only 5.3 per cent did not have a yard for the children's play. Play apparatus for the yard, like the ownership of toys, varied with the socio-economic status of the family.

A place for the storage of the child's playthings is important. For many generations the place for toys has been a toy box, possibly wooden, which is kept in an inconspicuous location. At first the toys are piled into it by the mother to bring order into the room. Later the child may be taught to collect his toys and place them there. This arrangement enables one to keep the room in order, but it has the disadvantages of limiting sharply the lifetime of many of the toys, of giving the child poor training in the care of his possessions, and substituting clearing up for *order* in his experiences. In the nursery school, open shelves are used for the storage of toys and well-loved books. "This is the garage for

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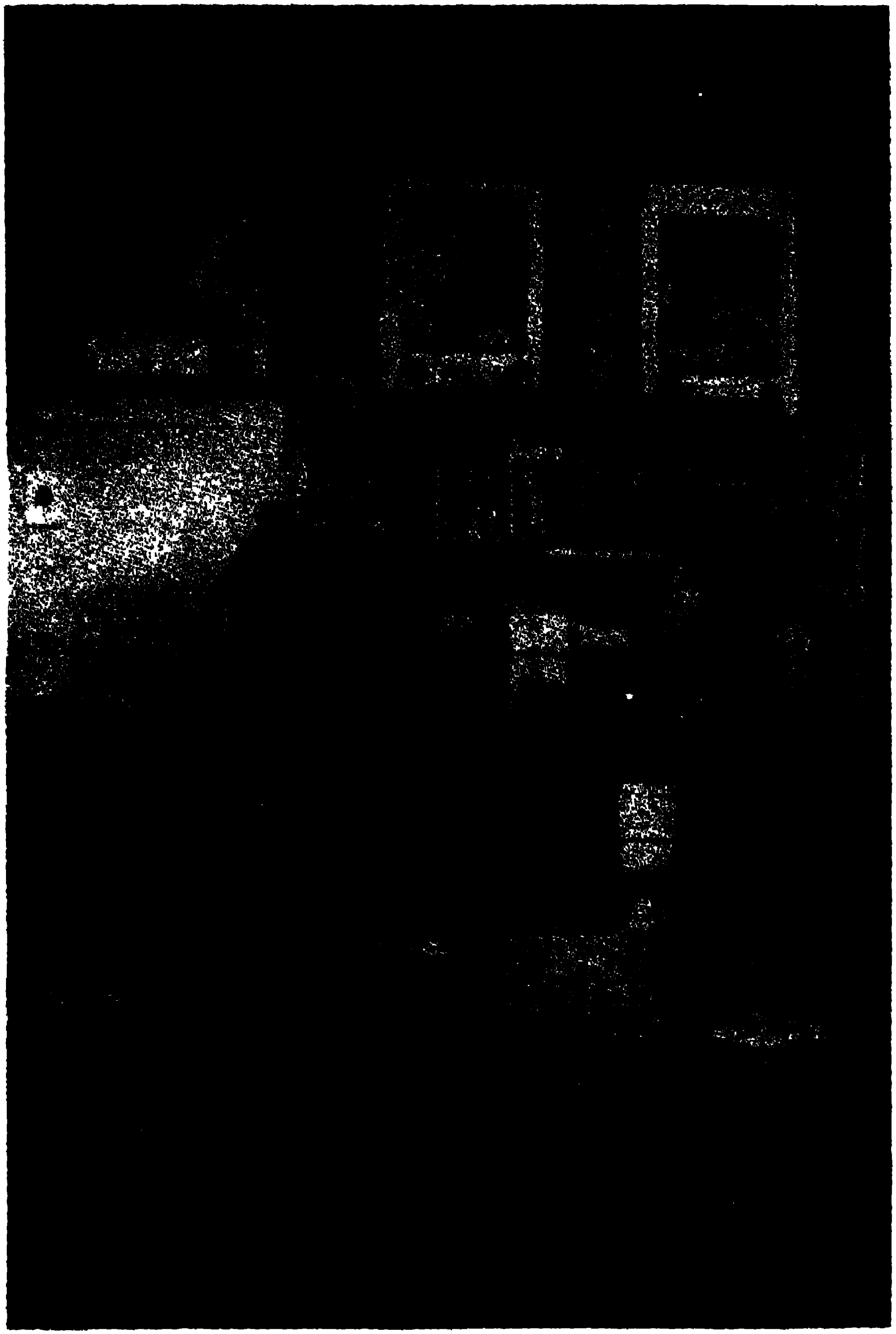
[1] The White House Conference on Child Health and Protection, *The Young Child in the Home,* p. 44. D. Appleton-Century Co., New York, 1936.

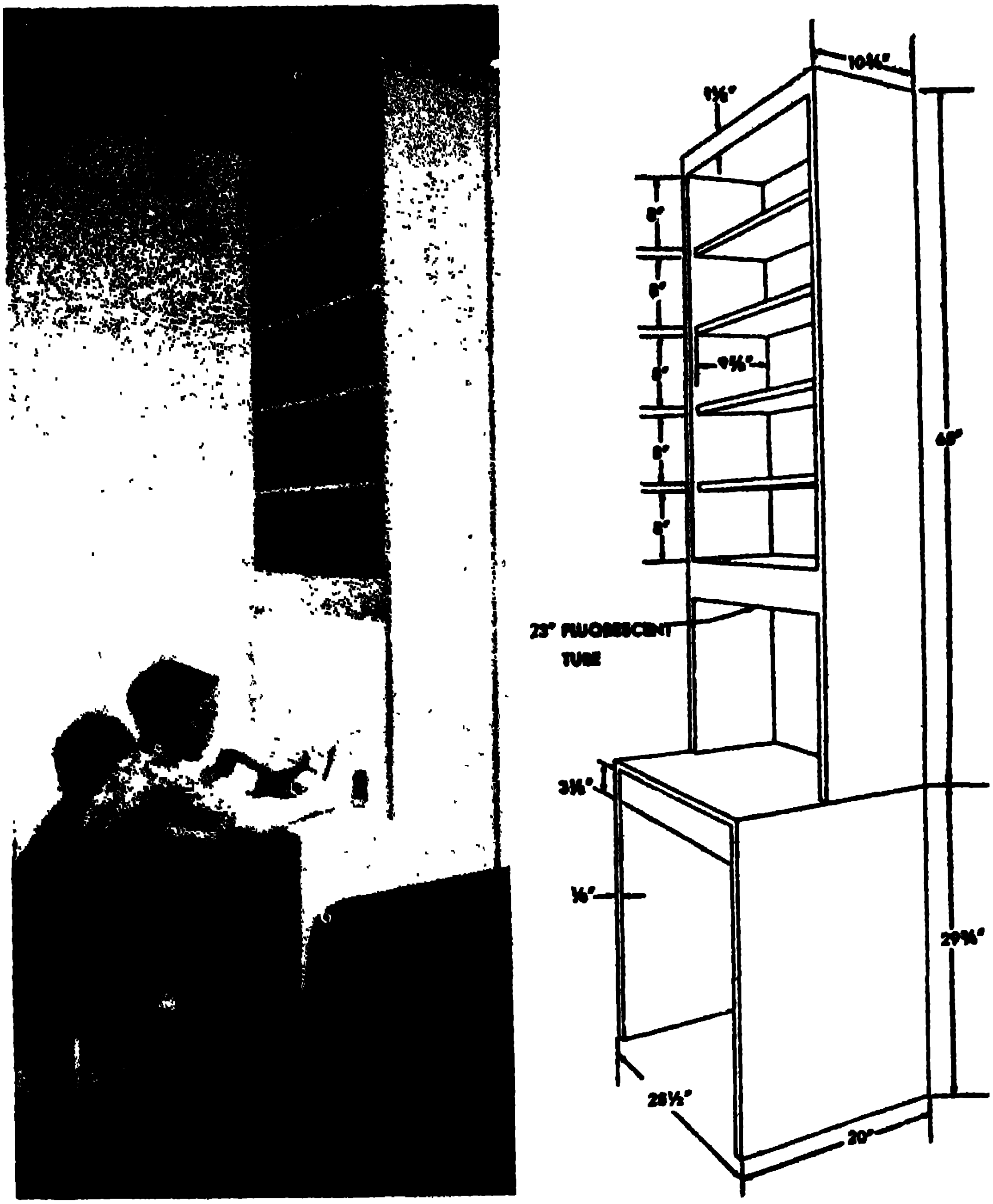


The modern nursery provides adequate storage space for blocks and other toys.

the peg board; this is the home of the cone; this is where the blocks live," a three-year-old was hear to croon as she placed the various articles in approximately the places from which they had been taken. Shelves may become disordered but so do boxes. Order is much more likely to be restored to the shelves. It should be remembered that a place to keep private possessions is one requirement of privacy, and at any age a violation of privacy is a serious offence. Inasmuch as the collections of butterflies, bones, or bugs may be inappropriate for some parts of the house, or distasteful to some member of the family, it is desirable that boys or girls be provided with adequate space for prized collections in playrooms or their own bedrooms. Habits of orderliness are fostered if proper space is provided for toys, clothing, and other things the child uses.

Although storage for small articles used in the child's play is important, provision for storage of larger pieces and for his play and school wraps must also be made. Where is the baby carriage, the tricycle, the scooter, the bicycle, the coaster wagon, or the skis kept? Are the hooks for play and school wraps at a height possible to reach by those who use them? The wrap closet and other general storage places should be provided with low shelves and hooks for the children. This teaches tidiness and neatness and decreases some of the confusion of leave-takings or of preparing to go outside to play.

From the time when a child begins to use hammer, paste, or scissors, increasing through the more serious work period, the need for the house to serve as an effective study and work center is acute. Privacy and quiet, so that one may study, read, or concentrate on some special individual interest are impelling needs. The living room is the place most frequently used as a study room. Although a living room in itself may be conducive to reading and study, it becomes a poor place if it is the only comfortable room in the house where members of the family can converse or listen to music. The temperature at which other rooms can be kept is dependent upon the type of heating plant and this in turn is largely dependent upon the income. Bedrooms may be used



Courtesy *Popular Home* and Hedrich-Blessing Studio

This built-in desk in the boy's room will serve him for many years. Note the well-diffused light directed toward the desk top.

for study in homes in which there is a central heating plant, but kitchens or dining rooms are often used in crowded dwellings in which stoves are used for heat. Dens and libraries or the dual-purpose room are convenient places for study in homes in which there are adequate means of heating.

The work that children may do in sharing in the upkeep of the home has changed with the introduction of the many conveniences that have eliminated the chores of past generations. Nevertheless there still remains a number of things which children can do to develop their sense of responsibility, their appreciation of home activities, and their interest in their homes. It is essential that any work done shall not take too much time from play and school. Aside from the small daily duties, such as care of personal things, emptying wastebaskets and the like, or care of pets, children like to help select and arrange household furnishings and participate in plans for changes about the home. Early in childhood a child can help in the kitchen with some tasks if a small table or some other low working space is provided, or if steps or a box raise him to adult working levels. The range of things he can do increases with his years. It is desirable that during early childhood he get to assist in various tasks, for this increases motor control and he feels the great importance of the help he gives.

Contact with growing things, whether they be animal or plant, is a valuable experience for children and may develop into a hobby. The care of pets is a satisfying activity, but limited space may not be available to permit having pets. An unused portion of a lot, however, may provide space to house small pets. Such provision relieves tension that might otherwise develop when proper outlets are not made. Also, the unused portion of the lot might well be used for productive enterprises to be carried on by the children alone, or in co-operation with an adult family member. There might be a vegetable garden which supplies the family table or adds to the income through sale of products. Flowers might be grown for profit as the child's project. Almost all children sometimes have the desire to set up stands and sell from them in front of the house. The beginnings of such interests foster a deep interest in the home.

Suggested Activities

1. Select a child. List in the order of importance the factors you will consider in furnishing a playroom for him.

2. Cite examples of homes in which the environment seems to have contributed to the development of a satisfactory personality.
3. Think of or visit, if possible, a home in which there are preschool children. List the provisions made for out-of-door play, including size of play yard, playground appliances such as teeter-totter, slide, sand-box, and swing. List provisions for indoor play. Is there a playroom? How are toys stored? In a box? In drawers or on shelves? What toys does the child have?
4. What playground facilities are offered for children in your community? Are they adequate? Do all the children in the community make general use of them?

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Problem 7. WHAT PROVISION SHALL BE MADE IN THE HOUSE FOR THE AGED?

The population of the United States has been consistently getting older for as long as age statistics are available.

1800—median age was 18.0 years
1930—median age was 26.4 years
1940—median age was 29.0 years
1950—median age was 30.0 years

By 1950, there were about 13 million persons aged 65 or more and these constituted slightly more than 8 per cent of the population of the United States. Between 1940 and 1950 the number increased by about 50 per cent as compared to an increase of 35 per cent in the decade, 1930 to 1940. In 1900, for every 100 persons aged 65 to 69 there were 137 persons aged 70 or over, in 1950 there were 142, and by 1980 it is estimated that there will be 150 persons.

Who were the aged in the population in 1950? There was a high concentration of one- and two-person families, about 68 per cent of the nonfarm families. The aged were predominantly women, about 52 per cent, and the proportion was greater among those aged 70 or more. Slightly more than one third of the women and almost two thirds of the men were married. More than half of the women, and about one fourth of the men were widowed.

It is important to give thought to the housing needs of those in the old age cycle of family life because of the increasing number of older people in the population, and because almost certain physical debility and declining activities and income present new problems. Although retirement from accustomed work is usual at age 65, general vitality and interest may continue at a moderate pace for some years. The first five years may be considered early old age, the second five years middle old age, and "old" old age thereafter. During the 20 or 30 years of the period of later maturity the needs and desires of the aging person change more than during any equivalent period of earlier adult life. The healthy-able-bodied, active individual may change to one who is frail or ill and in need of sheltered care and nursing services.

Students of physiology have identified progressive changes which occur with aging and are not due to specific disease:

1. Progressive degeneration and atrophy of the nervous system resulting in decreased speed, strength and endurance of neuromuscular reaction; impairment of vision, of hearing, of attention, of memory and of mental endurance.
2. Gradual impairment of the mechanisms which maintain a fairly constant internal environment for the cells and tissues. This results in retardation of cell division, and capacity for cell growth and tissue repair; gradual tissue desiccation and loss of elasticity; and gradual reduction of the rate of tissue oxidation (lowering of the speed of living).

There are, of course, chronic or acute illnesses which afflict the aged and interfere with normal physical, mental, or social life. The most common are: obesity, cancer, diabetes, hypertension, tuberculosis, syphilis, nephritis, glaucoma and other defects of vision.

In addition to the profound changes in the physical capacity of the individual as he grows older, there are other circumstances which must be considered. Companionship becomes progressively less when the spouse dies, children are absorbed in their own affairs, and friends move away or die. Financial resources become less sufficient for all the needs of personal maintenance and medical care.

Despite the problems connected with the process of aging, there is a universal desire among those past age 65 for continued independence in living arrangements. Ninety-six per cent of the population aged 65 and over live in private households. Included in this group are about 72 per cent of all aged persons maintaining their own households, 20 per cent living as relatives of the head of the households, and the remaining 4 per cent living in private households primarily as lodgers.

Older families can maintain their own private households because 68 per cent of the households headed by persons 65 years of age or older own their own homes. Such ownership is a part of their own social security programs, assuring them of a place to live as long as they are able to care for it and fend for themselves. For some, however, home ownership is undoubtedly a burden. Since most of families in which the aged live consist of couples or single individuals there is usually but little congestion, an average of less than 0.75 persons per room, in the homes of the aged.

The major problem then is concerned with housing those who wish to maintain separate private households. Consideration should be given to ways of adapting existing houses to the needs of the aged and of providing in the total supply new dwelling units planned for this group.

It is important to recognize that they want to live as normal individuals and keep their independence. Old people have less desire to be removed to the quiet byways than any other group. Since they need to be able to obtain their own supplies, the location of any dwelling for the aged should be accessible to shops, churches, and the homes of close relatives or friends. If a detached house is chosen it is important that it and its grounds be no larger than can be cared for without strain.

Special provisions that recognize the health and safety needs of older persons should be incorporated in any kind of dwelling. The living arrangements should be on one floor, with an elevator entered from the ground floor in every multiple-story building. It is desirable that the bedroom and living room have some sunshine during each day, and windows provide good exposure to prevailing summer breezes and have enough glass area to provide an interesting view and good daylight. The rooms should have uniformly distributed artificial lighting at a high level. Floor finishes should be nonskid. Bathrooms should have grab bars at water closet, bathtub, or shower. There should be no thresholds at the doorways and the opening should be wide enough to accommodate a wheelchair. Shelves should be so placed that they can be reached without undue stretching or stooping. Kitchens should be provided with garbage disposals, electric ranges, easily cleaned surfaces and a place to serve meals.

For some, residence with another household is the only solution. The theory that the aged are entitled to the protection of their children has become less and less feasible as our society has passed from one that was agrarian to an industrialized and urbanized civilization. In an agrarian or handicraft society old people made valuable contribution of their services. Today, with housework lightened by modern conveniences and few productive activities remaining in the home there are fewer duties for either the old or the young. In addition, the size of the dwelling is closely related to the rent or purchase price, and there is as little extra space as there is extra income. Truly, many of the problems that arise in relation to housing the aged reflect our inability to adjust time honored customs in which older people belonged to a large family group to the more limited functions which the family is able to perform at present.

The aging who live in the homes of relatives or friends comprise a small and unstudied segment of the population. Were statistics available for this group it is likely that the physical aspects of their present housing accommodations would be good. There are, however, psychological, emotional, and human relation factors involved in the situation which may make otherwise satisfactory housing less desirable, both for the aged and for the younger family.

When it is necessary for a three generation family to live together the objectives should be that provision should allow the younger generations to continue their interests in a normal way and at their own pace and at the same time attend to the needs of the older members: that the older generation benefit by being a part of a family and develop some interests of their own.

The old remain at home a great deal and are interested in the minutia going on about them, the passers-by, the clouds, and the weather. A favorite chair by the window would allow activities of the street or outside to compete with the activities of the house. Space to pursue a handicraft or other hobby may give great satisfaction. In some cases, a small apartment may be built in the house which enables the old to prepare and eat some meals, follow their own pattern of life, and yet have the security they need. In some families a private bath for the aged would be all that is necessary for reducing tension.

Sometimes the most suitable arrangement for housing the aged is in some form of institutional living. Congregate accommodations are certainly required for those who feel unequal to looking after their own households and for others who fear they will not be taken care of in time of illness, or for other reasons need or prefer group living arrangements. Included in these institutions are nursing homes, convalescent homes, public and private homes for the aged. These homes vary widely from a more or less luxuriant atmosphere to miserable accommodations. Usually they are supervised by social agencies and must meet minimum requirements for providing physical facilities. Only a small part of our aged population need such special services but numerically they are a large group of people. The proportion of elderly persons in quasi-households is about twice as great as the corresponding proportion for the total population.

In general, homes for the aged should be located in centers of population easily accessible to persons they are serving and to their families and friends, to transportation, church, shopping facilities, movies, and a general hospital. If the home is large there should be a chapel for religious services or for entertainment purposes. There should be a library and rooms for recreational and occupational therapy classes. For hygienic as well as morale building purposes there should be a barber shop, beauty parlor, and chiropodist's office.

Suggested Activities

1. In what ways may the inclusion of an aged member in a family change the use made of the house?
2. What housing arrangement would you make for an aged relative?
3. What are the benefits for the aged from the Social Security Act? How have these benefits affected housing for them?

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UNIT TWO

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The House and Its Environment

WHEN a family has given adequate thought to its requirements for housing that it is fully aware of the intricacies of the house design desirable for its members, and has tried several possible patterns, it must give consideration to the environment in which the house will be placed. Principles of good house planning should be applied whether the family chooses a single family house, a two-family house, a row, or a multiple-family dwelling. Indeed, their choice of any of these types will depend upon the suitability of the type to the situation.

An understanding of community development is important, as the desirability of the home location is affected by anything that has influenced the course of community growth, urban or rural. In addition, the final choice of how the house will look, in its style and on its exact site is dependent upon a body of information to which the family can turn for guidance.

Problem 1. IN WHAT KINDS OF HOUSES DO PEOPLE LIVE?

Various bases have been employed in attempts to classify American dwellings into kinds or types. Architectural style seemed a sound basis for classification, but in use its application has not proved wholly successful. Confusion results from the use of each of the terms, "English," "Colonial," "Gothic," or "Modern," to describe a wide variety of dwellings and civic and commercial buildings. Because of the inclusiveness of each term, its significance has become largely lost and the value of such a basis for classification becomes slight. At best, data collected on such a basis would only indicate taste, past and present, as expressed in facades.

In the report of the 1940 census, a dwelling unit was defined as "the living quarters occupied by, or intended for occupancy by one household, located in a residential structure containing one or more dwelling units." The dwelling unit may be a detached house, or it may be one of several in another residential structure such as a two-family house, a row house, an apartment house, or other multiple-family structure. In addition, the dwelling unit may be a room or rooms in a structure primarily devoted to business or other nonresidential purposes such as: a superintendent's living quarters in a public building as a courthouse or library; a watchman's living quarters in a factory, store, or warehouse; a chauffeur's living quarters in a garage; or a tourist cabin, trailer, railroad car, boat, or tent occupied by persons having no other place of residence.

This classification is based on the number of households in the residential structure and is one indication of the extent of land occupancy. For each type of dwelling unit in any residential structure there are inherent in it advantages and disadvantages for certain family and individual living.

Courtesy American Houses, Inc.

A detached house may have only one story.

The detached house is, as the name implies, detached and free, standing from other structural units with open space on all four sides and designed for occupancy by one family from ground to roof. The advantages of this type of dwelling, generally speaking, include privacy for family life and freedom for the family and for its individuals; access on all four sides to sunlight and to outer air; access on all four sides to the ground, with space for a garden and plenty of play space for children; flexibility both in room arrangements expressed in exterior and interior designs and in alterations, permitting practical adjustments to family needs; minimum fire risks from off-property hazards; and higher probability of ownership and the attendant promises of a permanent family home. This type of house is usually easy to maintain, as in many cases repairs can be made by the occupant.

The disadvantages of the detached house include higher construction costs than are involved in a corresponding area in a multiple-family dwelling; higher heating costs than are required for the same area in a multiple-family dwelling; the responsibility of the oversight and care of property, including repairs, and upkeep of the surrounding land as well as the

Courtesy American Houses, Inc.

A detached house may have two stories.

full responsibility for all details of household management. The detached house usually necessitates a greater length of streets and provision for utilities per unit than other types of dwelling and also requires more land than any other type. These factors restrict the range of available locations. If this type of dwelling is located in an area where land values are high or where there is need for large numbers of families to live, many houses are often crowded closely together, thus nullifying the supposed advantages of sunlight, air, and space for gardens. Some have said that when this condition exists there is less privacy in the detached house than in some other types designed primarily for crowded land conditions.

Houses of this variety and type are found in suburbs, in the rural town, and in the country. The suburban dweller is anywhere from fifteen minutes to an hour away from his place of work, which he reaches by means of public conveyance or his own car. Usually he seeks quiet, peace, gardens, and neighborliness not supposedly characteristic of urban residences.

Let us consider the type of house which comes to mind when one hears the words "suburban home." The dwelling stands on a lot usually not larger than 70 x 100 feet. Its style is English, Spanish, Colonial, Georgian, or a mixture of these. Or it may be an old house with some modern modifications of plumbing, heating, and wiring. A gravel or cement walk leads from the street to its front door, which may be far from the street. If it is a new house, it will show the present tendency to get as near the street as building laws permit and to devote the back of the lot to private uses. There will be attractive plantings around the house and a garden in the rear where some vegetables or flowers or both are grown. There is a basement containing the heating plant, laundry facilities, and occasionally game rooms or storage space. The shape of the house varies from rectangular, which is the most economical, to the T or the L shapes, to a completely irregular plan dictated by the tastes of the family and the size and shape of the lot. The latter are more expensive to build but are also more picturesque. They are usually of two stories as the one-story house occupies too much of the lot area and costs more to build. The second story may be a half story under the roof with rooms having dormer windows. Entry directly into the living room is relatively rare, for even a small vestibule is an aid to the privacy of the family and also serves to preserve heat in winter. Often the garage is attached to the house but detached garages are still common.

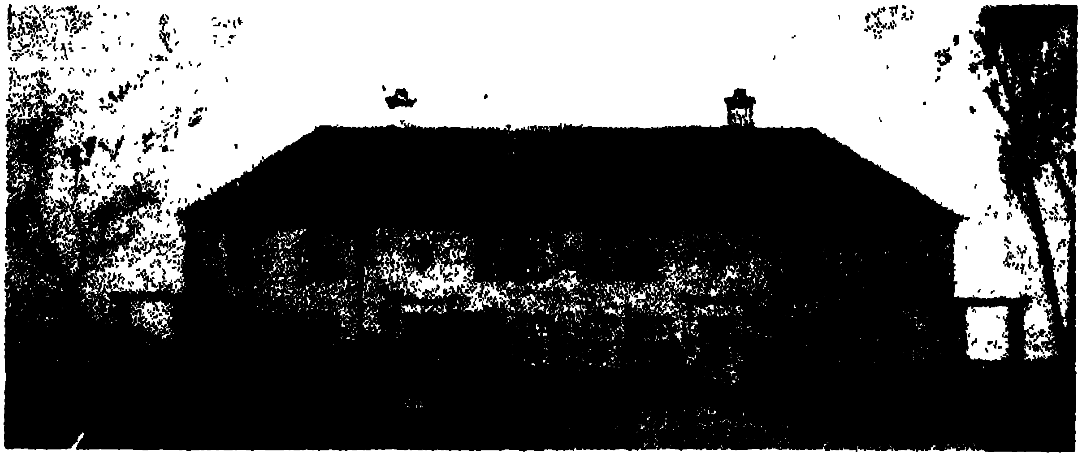
There is another type of suburban home less frequently pictured but wholly familiar to any one who passes through the outskirts of large cities. Here one sees small houses planned to house individual families and built close together. They have so little space around them that the conditions are essentially urban. It is customary for a builder to develop a whole street from one architectural idea, and often from one plan and elevation, variety being derived from various ornamental devices. The plans are simple, consisting of living room, dining room, kitchen, and two bedrooms and bath. Usually no fireplace is provided. The garage is usually a detached one-car frame building. Garden space is small or lacking, and plantings are seen infrequently.

The dwellings in the rural town seem to re-echo with a diminution in scale those of the urban section. These homes run the gamut from the somewhat pretentious home of the banker to the simplest cottage. Usually they are all the single-family detached dwelling.

The term "farmhouse" brings to mind for each of us the sort of dwelling that characterizes the farms with which we are most familiar: the low rambling adobe ranch house of the Southwest, the stately plantation home of the South, the prim green-shuttered farm home of New England and spacious farm homes of the Midwest with broad screened verandas balancing well the huge red barn and windmill. Our memory is selective and may bring to our minds only part of the picture. Back of the ranch house are the sheds of the Mexican workers, back of the plantation home the shacks of the Negro laborers, and not far from the prosperous-appearing home in the Midwest is the unpainted, unplanted, and inconvenient house of a renter or the hired hand. Structurally, all these dwellings may be grouped with the one-family detached house of the owners but there the resemblance ceases. Wide differences in conditions may be readily observed.

The two-family house is designed to house two families in separate quarters in one structure. The term, duplex, is often applied to this type of house and has different connotations in various sections. For example, in some parts of the country the term applies to a double house divided by a party wall, and in other parts of the country it applies to a house designed to house two familes each on a separate floor. In another part of the country, the term may be applied to either method of arranging the dwelling units in the structure. In any case, the two-family house is a space-saving structure intended to use limited land area to a better advantage than that afforded by placing two detached houses closely together.

The two-family house which utilizes two lots and places each dwelling unit side by side, with a party wall built on the



Courtesy Buhl Foundation, Pittsburgh

The entrances to two-family houses may be arranged to provide privacy for both families.

lot line, has certain qualifications for benefiting family life. Each dwelling unit is usually separate from the other and may be built in one or more stories. Such a plan sacrifices two corner rooms on each floor and light and air along one entire side of the house for the economies of a party wall. It does keep one side yard as well as front and rear yards for the family. The plan of the house must necessarily take the form of a row of rooms, if rooms other than halls, without outside exposures, are to be avoided. Houses of this type are found in the larger towns, and in some of the same sections in the city as is the one-family detached house. Because of the wider space left on the lot there may be really more sunlight and air and privacy in this type of house than in the one-family detached type. Complete privacy in this type of house can be secured only if the front doors are widely separated and common walls are well insulated against noise.

The two-family house which accommodates one family on each floor gives each family the advantage of living on a single level. Corner rooms and free access to light and air are provided for each family. The building economy lies in a common roof and foundation. The genesis of the two-family house probably lay in the desire of an owner to help pay his own charges by renting the upper part of the house. Some houses lend themselves well to remodeling designed to accommodate

Courtesy American Houses, Inc

Row houses may be plain and monotonous.

a second family in the upper story. Entrance to each dwelling unit should be as private as possible. Often there is one front door opening into a hall from which entrance is provided to the first floor unit through its own door, and to the second floor unit through the stairway. In some parts of the country entrance to the second floor unit is provided by outside stairs. The two-family house just described is completely detached so that technically there should be light and air from all sides. However, often the lateral space between such houses is slight, hence the principal light and air must come from the front and rear. The ground space is often inadequate, especially that provided for the family living in the second story.

The row house is a further attempt to provide shelter for many families on a small amount of land. These dwelling units range side by side, each having a common party wall with its neighbor and each having its own private entrance. The structure may follow the line of the street, providing entrances from the street, or it may form a court with entrances from the court. The row house may be all on one story or there may be two or more stories for each dwelling unit. Any row house sacrifices all corner rooms and light and air along two sides for the economies of construction and of a lot only

Courtesy Buhl Foundation, Pittsburgh

Row or group houses may be attractively designed.

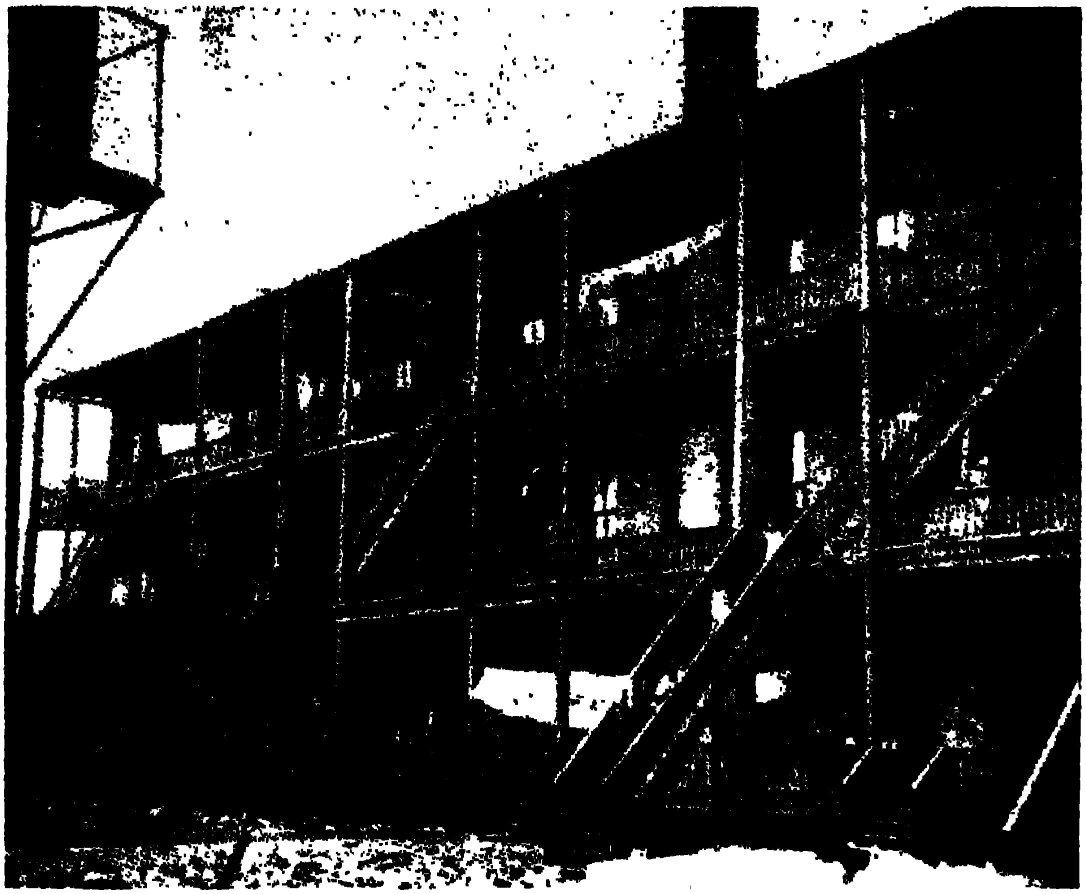
as wide as the house itself. An exception to this is the two-story row house built on a hillside. It is possible, then, that the upper story may have its corner rooms exposed to light and air. If the row house is built only two rooms deep, it gives direct exposure to street or rear yard for each room, but cross ventilation is lost. The cheapest row houses are unbelievably ugly; however, good planning may contribute much to utilization of the idea and the improvement in appearance and liveability of these structures. The row house is cheap to build because it takes less material than either of the other types of dwelling units discussed. It is also usually cheaper to heat and to maintain. On the other hand, fire-resistant materials are even more essential to it than to the detached and two-family houses.

The use of row houses dates far back into history and they may have been developed because of high land values, because of the economy in building offered by common walls, or because the people desired to live near each other for friendliness or for purposes of defense against a common enemy. In certain parts of the country the use of the row house is more prevalent today than in others. It has had wide use by industrial concerns which make provision for the housing of their employees. At present the row house may be located near the business center or farther out toward the edges of the city. Home ownership of such houses is possible but rare since the homeowner usually prefers more individuality than the row house provides.

Row houses of this type appeared early on the American scene.

An apartment house or a multiple-family dwelling is designed to house three or more families in one structure. The organization of the units within the structure varies from the simple arrangement wherein a third or fourth story designed for occupancy by one family is added to a two-family house, to complex arrangements brought about by the location of apartments opening out into a common hall on each of several floors. The number of floors is dependent somewhat upon whether an elevator is available. In the United States it is generally agreed that three stories is the maximum for "a walk-up on stairs." The multiple-family type of dwelling is the most economical of all types in the use of land. It is probably the most economical means of producing small dwelling units and of accommodating families demanding considerable service.

Such dwellings in general can provide light only on two



Courtesy U. S. Housing Authority

Three-decker walk-ups are a common type of multiple-family dwelling in some cities. These dwellings, characteristic of slum areas, are subject to many disadvantages.

sides and sometimes on only one side. The entire apartment used by a family is usually on one floor, and a common stair or elevator serves a number of dwelling units. Heat is supplied by central service and does not concern the apartment dweller, except when it is desired and it is not available because the date for heat has not yet come. Home ownership of an apartment dwelling unit through a corporation of homeowners occupying the apartment building is possible, although renting is the common practice. Usually apartment houses are located near some form of rapid transportation: Living in an apartment relieves the head of the house of all responsibility of shelter by the mere payment of the rent, and likewise the woman of the house may be relieved of many domestic duties usually performed in the private dwelling.

"Garden" apartments attempt to bring nature to the apartment dweller. The center of the block is partially or wholly surrounded by the building and is devoted to grass, trees, flowers, and playground. Because of the high land values. rent for such apartments is usually high and the dwelling space small. Another method of bringing nature to the apartment dweller is that of landscape gardening the roof area of a tall apartment or other building where "penthouses" are located. This practice is not new but part of an old urge to see green foliage and watch it grow. Nebuchadnezzar, to satisfy such a desire, built the hanging gardens of Babylon for his favorite wife.

"Tower" apartments are characterized by their great height, modern compactness, and desirable location. There may be a variety of plans in the same building. Usually the apartment does not provide a dining room. Children are not accepted as a part of the usual family scheme and provision is not made for overnight guests.

In some expensive apartments an effort is made to duplicate the provisions of the detached house. There is room for children, for entertaining, and for overnight guests. In addition there may be common facilities for play, natatoria, sun rooms, roof gardens, and billiard rooms. It is rare in this type of apartment, or in any other, to find neighbors who know each other well.

Bemis and Burchard[1] sum up the apartment situation thus:

> It must be remembered, then, of the multi-family type of urban dwelling that it may vary considerably in accommodation and beauty, but that it is always subject to certain common disadvantages—noise, incessant struggle against dirt, propinquity of neighbors, and lack of proper outdoor play places. It gives in larger measure than any suburban life can, service of all kinds, freedom from minor domestic duties, access to museum, zoological garden, library, opera, and all forms of purchasable amusement.

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[1] Albert F. Bemis, and John Burchard, *The Evolving House*, vol. 1, "A History of the Home," p. 408. The Technology Press, Cambridge, 1933.

Although low standards for the housing of families may be found in any type of dwelling unit, multiple dwellings comprise the major part of housing in slum areas. In general there is much land overcrowding as well as room overcrowding. Slum dwellers are at the bottom of the city's economic scale. Usually they are people who must take what they can get at the lowest possible price. Formerly, all of the poorer residents of the city were housed in buildings especially built to provide a sort of shelter at the lowest possible price. For the most part these were large, many-storied structures containing a large number of rooms, many of which had no access to fresh air or daylight. Recent structures are limited by law as to the amount of block area that can be covered and the method of covering it, and many of the older buildings are now being removed as a part of a slum clearance program. In any city the passage of time brings about a decadence of some of the most desirable parts as well as other areas, and thus brownstone houses, old frame houses built close together with common party walls, and apartments of the outmoded type may become slums.

The extent to which each of these types of dwelling units is used by American families is shown by figures drawn from the 1940 census. These figures show only the types of dwelling units and nothing concerning the condition of the dwelling.

Data dealing with the structural type give but half the picture. We need to know not only the structural type but the condition of these dwelling units. Do they meet minimum standards? Are they available at reasonable cost for each of the income groups? The following statement of minimum housing standards was drawn up more than 35 years ago:

> . . . for every family a safe and sanitary home; healthful surroundings, ample and pure running water inside the house; modern and sanitary toilet conveniences for its exclusive use, located inside the building; adequate sunshine and ventilation; reasonable fire protection; privacy; rooms of sufficient size and number to decently house the members of the family; freedom from dampness; prompt, adequate collection of all waste materials. These fundamental requirements for normal living should

DWELLING UNITS BY TYPE OF STRUCTURE, FOR THE UNITED STATES, URBAN AND RURAL: 1950.[1]

Type of Structure	Urban and Rural Nonfarm				Rural Farm
	United States	Total	Urban	Rural Nonfarm	
Total Dwelling Units	45,983,398	39,625,455	29,569,073	10,056,382	6,357,943
Percentage					
1 dwelling unit, detached	63.3	58.1	48.9	85.2	95.6
1 dwelling unit, attached	2.6	2.9	3.6	1.1	0.7
1 and 2 dwelling unit, semi-detached	3.5	3.9	4.4	2.4	0.6
2 dwelling unit, other	11.5	13.0	15.3	6.3	2.3
3 and 4 dwelling unit	7.3	8.5	10.5	2.4	0.3
5 to 9 dwelling unit	4.6	5.4	6.9	1.0	0.1
10 to 19 dwelling unit	2.4	2.7	3.6	0.3	0.1
20 to 49 dwelling unit	2.6	3.0	4.0	0.1	
50 dwelling unit or more	1.5	1.7	2.3		
Trailers	0.7	0.8	0.6	1.3	0.2

be obtainable by every family, reasonably accessible from place of employment, at a rental not to exceed 20 per cent of the family income.[2]

In a report of housing conditions in 64 cities of the United States as determined by the real property inventory, it is stated that in these cities: [3]

23.5 per cent of the houses lacked bathtubs or showers.
17.1 per cent of the houses were crowded.

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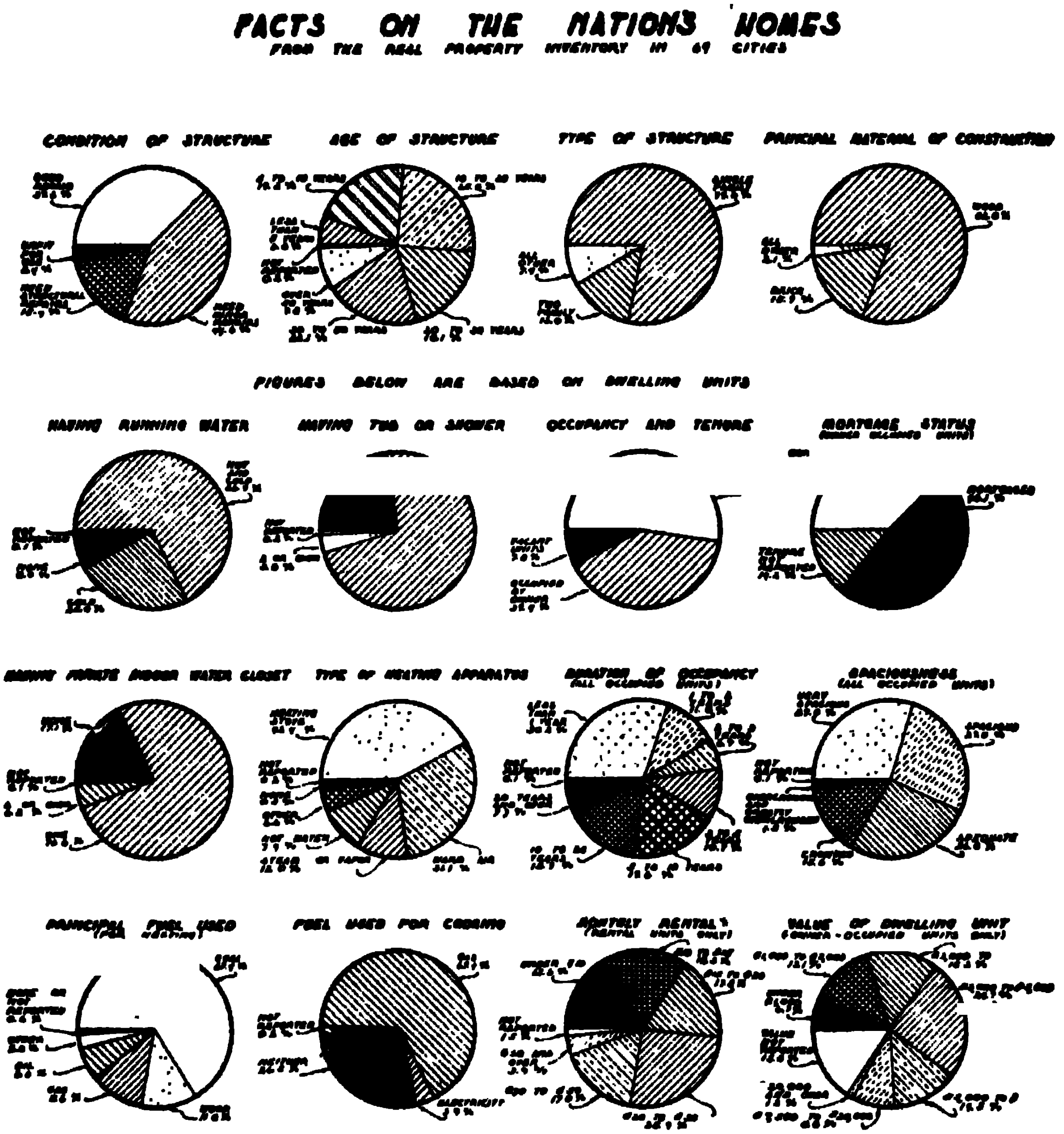
[1] *Census of Housing: 1950. Vol. I General Characteristics* Part I *United States Summary*, from Table 5, pp. 1-3. Government Printing Office, Washington, 1953.

[2] *Proceedings National Conference of Charities and Correction*, pp. 391–392, 1912. National Conference of Charities and Correction, Cleveland, Ohio.

[3] Alanson D. Morehouse, "The Real Property Inventory of 1934," *Survey of Current Business*, vol. 14, pp. 16–17, Nov., 1934. U. S. Department of Commerce. Bureau of Foreign and Domestic Commerce.



Courtesy Bureau of Foreign and Domestic Commerce, U. S. D. C.

Facts on the nation's homes as revealed by the Real Property Inventory in 64 cities. All figures are based on dwelling units.

17.3 per cent of the houses lacked private indoor toilets.
9.4 per cent of the houses lacked modern lighting.
14.1 per cent of the houses did not have running water.

The census for 1940 indicated that approximately seven million non-farm dwellings in the United States out of a total of 29.6 million were substandard and in need of repairs and replacement. The extensive use of deteriorated and obsolete dwelling units shows that construction for replacement of substandard housing during the past generation has been insufficient.

Studies of rural homes indicate that these, too, fall far short of meeting the standards cited. A study made in 1926 of nearly 3,000 white farm families in selected localities in 11 states was summarized by Kirkpatrick as follows:

> Slightly more than a twentieth of all the homes reporting were completely modern; that is, fitted with central heating and central lighting systems, running water, kitchen sink, bathroom (equipped with stationary tub and bowl) indoor toilet, and sewage disposal. About a fifth of the homes were partially modern; that is, fitted with part of the improvements named. Almost three-fourths of the homes have none of the modern improvements mentioned above.[1]

Not a great deal of improvement of the picture of rural housing is presented by the 1940 census. The greatest improvement is in lighting the rural home. Statistics show that almost one-third now have electric lights.

Some improvement is presented by the 1950 census, especially in lighting. Over three-fourths now have electric lights.

RURAL FARM DWELLING UNITS BY LIGHTING AND HEATING EQUIPMENT, AND REFRIGERATION, 1950.[2]

SUBJECT	NUMBER	PER CENT
Rural farm dwelling units	6,357,943	
Electric Lighting		
Number Reporting	6,202,235	100.0
With electric lights	4,817,770	77.7
No electric lights	1,384,465	22.3
Heating Equipment		
Number reporting	5,588,245	100.0
Central heating	1,013,150	18.1
Non-central heating	4,510,055	80.7
Not heated	65,040	1.2
Refrigeration Equipment		
Number reporting	5,621,650	100.0
Mechanical	3,526,160	62.7
Ice	662,705	11.8
Other or none	1,432,785	25.5

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[1] E. L. Kirkpatrick, *The Farmer's Standard of Living*, p. 22. U. S. Department of Agriculture, Department Bulletin 1466, 1926.

[2] *Census of Housing: 1950 Vol. I General Characteristics*, Part I, *United States Summary*, from Tables 12 and 13, pp. 1–9. Government Printing Office, Washington, 1953.

Even before 1940 a housing shortage was apparent in the United States. For many years not enough new houses had been built to keep up with the normal growth in demand built up by increase in population. The number of non-farm homes built fell from a peak of nearly a million in 1925 to less than one hundred thousand in 1933. From this date there was a gradual recovery until 1941 when about three quarters of a million dwelling units were built. Then the war put an end to residential building.

In the intervening years studies had been made to determine what portion of the population is being served by the housing available on the market. Because so large a percentage of American families are renters, there is interest in finding what sort of homes they may be able to obtain. In a report of the National Housing Committee in 1938 on the housing shortages for non-farm families,[1] it is pointed out that a real relationship exists between the ability of a family o pay and its housing facilities. For those who can afford to pay $30 a month or more, there is no shortage of housing; these families are already well supplied with decent homes. Those families who can pay $20 to $30 will find the choice of a dwelling more difficult. There is a shortage of 435,370 dwelling units in this group. The situation becomes more acute as the ability to pay decreases. Those families able to pay $10 to $20 per month for rent find the supply 1,405,779 units less than the demand. There are 195,409 additional units needed for families able to pay $10 per month or less. In other words, there was in 1938 a need of 2,036,558 units in order to meet the demand for dwellings by the non-farm low-income group of our population.

The shortage of dwelling units for the lower income group extended to those families who wished to buy as well as to those who desired to rent. In 1941, 55 per cent of the non-farm families earned less than $2,000. In the same year only 21 per cent of the houses built were valued at less than $4,000. If the rule of thumb estimate that the price of a house should not

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[1] Henry Goddard Leach, "A Housing Era?" *The Forum*, vol. 99, pp. 65–66. Feb., 1938.

Courtesy Federal Public Housing Authority

These are illustrations of a quonset hut converted into a family dwelling unit. an attempt to make dwelling units out of structure originally designed for other purposes.

exceed twice the annual income is valid, this means that in the year 1941, only one-fifth of the houses built were in the price level needed by one-half of the people. In regard to this condition The Woman's Foundation says: [1]

> It is obvious that little new housing is being produced at costs which families in the lower income brackets can afford. In view of this fact the lower-income families are almost entirely dependent upon the existing housing supply and in general must live in housing which has depreciated in value sufficiently to come within their means. For many of them, when this occurs, the housing is quite likely to be substandard. . . . Much of the supply of existing housing has been remodeled or altered to make it available at prices low-income families can afford, often with a resulting compromise with acceptable standards.

A survey of American dwellings on the basis of structures indicates that in both urban and rural sections the single-family detached residence is by far the most common. How-

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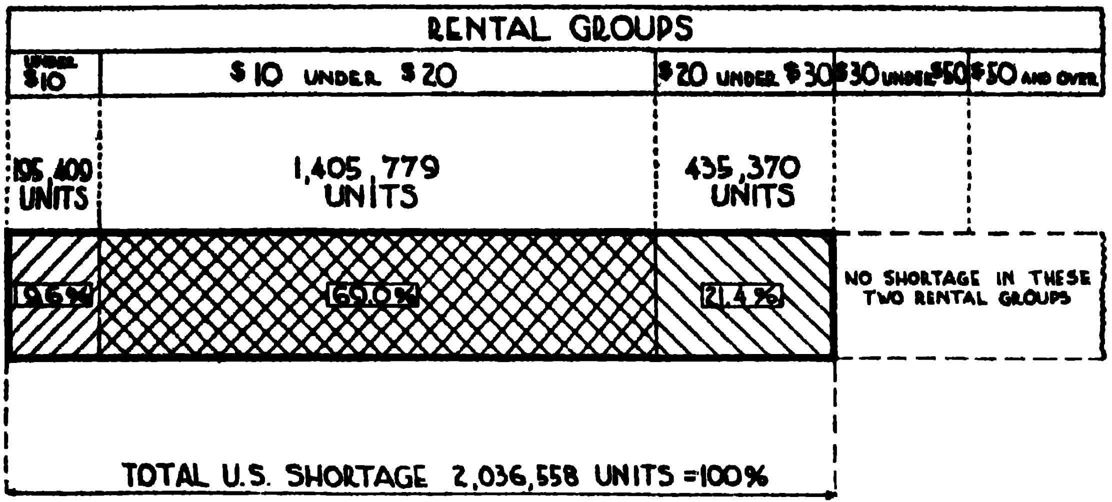
[1] Committee of Consultants on Housing for the Family, *Improved Family Living through Improved Housing*, p. 8. The Woman's Foundation. 10 East Fortieth Street, New York City, 1945.



Courtesy National Housing Committee

Total U. S. shortages of non-farm family dwelling units, by rental groups, 1938.

ever, the type of houses owned by families varies widely according to the section of the country. In the Pacific Coast cities, outside of San Francisco, the one-family detached house is the sort of house owned by over 95 per cent of the families who hold title to their homes. In Philadelphia, approximately the same percentage of the home owners have as their "home places" semidetached or "row" houses. Considering these homes in terms of our personal experiences with such houses we may arrive at the conclusion that the *kinds* of houses in which the American people live are wholly satisfactory. If we turn from a consideration of structural characteristics to a consideration of the provisions made by these and the other dwellings for the health, safety, and mental and moral well-being of the people dwelling in them, we find that as yet America lacks much of meeting the standards promulgated more than twenty-five years ago as the minimum requirements for a safe and sanitary home. There is in a democracy an interrelation among the families from the luxurious mansion, comfortable home, humble cottage, and squalid hovel that makes the kind of houses in which people live in any community of vital importance to all citizens of that community and of the state and nation.

The shortages of houses made more acute by the increase in the number of families following World War II cannot help but accentuate a situation already difficult. It appears that for at least ten years over a million non-farm dwelling units will be required annually. There will also be a heavy demand for new farm dwellings. From studies made it appears that more attention should be paid to housing units designed for the lower two-thirds and especially the lower third income groups in our population.

Suggested Activities

1. Write a brief summary of the housing situation in your community including the types of houses, their adequacy, and their condition.
2. For the community with which you are most familiar, ascertain the common rentals charged. What kind of dwelling is available at a rental of $50, $30, $10 per month? Evaluate each group in terms of structure, location, and conveniences.
3. What evidences are there in your community of the interrelation between the house, its kind and condition, and the financial status of the families living within?

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Problem 2. HOW DOES COMMUNITY DEVELOPMENT AFFECT THE DESIRABILITY OF THE HOME LOCATION?

When a home seeker sets out to find a site for a house, many factors should enter into his decision. It is important that a suitable place be found, because the home will probably be the center of the family life for many years. The children will be brought up in it and in its surroundings. The work of the home will be done there, and much of the leisure time of the family will be spent there. The different available properties should be considered and measured in the light of the pattern of life which the family desires to live. The family might well picture in great detail its routine, consisting of household activities, community opportunities, going to work, to school, to play, to shop, daily and in all seasons, before starting on a search for a desirable home place.

For dwellers in towns and cities the problem of finding desirable places for their homes seems to require an understanding of the direction and extent of the growth of the city and the restrictions placed on various sections if such there be. A home seeker must usually choose between areas of high and low land values. These are affected by direction and extent of city growth and amount of regulation which a strong program of city planning has given it.

The structure of a city does not usually remain static. The pattern of neighborhoods and land uses established at one period of time changes as the city grows. The rate of movement of neighborhoods, or the time required for a residential section to change its character, varies greatly from city to city and in any one city from one period to another. The forces that determine the speed of neighborhood transition are not clearly understood, but there are some phenomena of city growth that are understood.

Growth of the residential section of a city is in the direction of its high-rent or high-quality neighborhoods. These follow a definite path in one or more sectors of the city. What determines the point of origin of the highest rental areas of the city and the direction and pattern of their future growth? The high-grade residential area has its point of origin near the retail and office center. The higher-income groups work there and this section is on the side of the city opposite to that occupied by industry and warehouses. From this point the future growth is governed by some combination of the following factors:[1]

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[1] Homer Hoyt, *The Structure and Growth of Residential Neighborhoods in American Cities*, pp. 114–119. Federal Housing Administration, Washington, D. C., 1939.

1. High grade residential growth tends to proceed from the given point of origin, along established lines of travel or toward another existing nucleus of buildings or trading centers.
2. The zone of high-quality residential areas tends to progress toward high ground which is free from the risk of floods and to spread along lake, bay, river, and ocean fronts, where such water fronts are not used for industry.
3. High-quality residential districts tend to grow toward the section of the city which has free, open country beyond the edges and away from sections which are limited by natural or artificial barriers to expansion.
4. The higher-priced residential neighborhoods tend to grow toward the homes of the leaders of the community.
5. Trends of movement of office buildings, banks, and stores, pull the higher-priced residential neighborhoods in the same general direction.
6. High-grade residential areas tend to develop along the fastest existing transportation lines.
7. The growth of high-rent neighborhoods continues in the same direction for a long period of time.
8. Deluxe high-rent apartment areas tend to be established near the business center in old residential areas.
9. Real estate promoters may bend the direction of high-grade residential growth. Reversing the natural trend of high-grade neighborhoods is not usually possible, but acceleration or bending the natural trend is often done.

In a city manifesting little or no population growth, residents may continue to live in the same houses and shop at the same stores for long periods of time. There is no influx of newcomers into the established residential areas and little or no expansion of stores or factories to cause change in existing land uses. While it is conceivable that residents may move to new locations and leave their old homes, there is no pressure to cause them to migrate, and inertia and family ties are frequently sufficient to keep them rooted to a fixed spot for generations. In such cities the pattern of land uses and neighborhoods remains unchanged for long periods of time.

The rapid growth of a city, on the other hand, necessarily involves the introduction of new and strange elements into the city structure. If the population growth is attracted by new industries, factories may invade residential areas and render them undesirable for high-grade occupancy. Or, new industries may draw to the city unskilled laborers with lower living standards than the earlier population. The entry of these newcomers into existing residential areas hastens changes in the character of neighborhoods. The increase of population in a city forces an expansion in stores, warehouses, and office buildings. In addition, this expansion frequently causes a transition in types of land use in areas bordering central business districts.

Of even greater importance is the effect of building new homes to take care of the added population. New residential structures on the periphery of the city compete with the old dwelling units. The influx of newcomers causes a shifting and filtering process that profoundly affects every neighborhood in the city. All of the new arrivals do not occupy new homes. Many of the old residents move to new and more attractive homes farther removed from business and industrial sites, while many of the new arrivals enter old neighborhoods and occupy homes vacated by the previous occupants. Thus, stresses and strains are set up that accelerate neighborhood change whenever a large number of new arrivals enter a city and cause a building boom. The added population causes a pressure for space, a rise in rents, and an increase in building. But the effect of its entry is not confined to a mere quantitative change in building supply; it may also cause qualitative neighborhood changes.

Thus in a slow-growing or declining city, all the neighborhoods may decline at a similar rate. In this case there may be less differential change between the various neighborhoods in the city since there is a general decrease in the quality of all home areas. In cities growing rapidly in population, on the other hand, there are more likely to be sudden transitions in the quality of some neighborhoods. There will be cases of some neighborhoods improving in quality, others remaining static, and still others declining.

The rate of neighborhood change may vary even among cities growing in population at the same rate. The component elements of the added population are of extreme importance. For instance, in a recent study, it was shown that there was a more rapid transition in residential neighborhoods in Northern and Midwestern industrial cities that attracted unskilled laborers from other countries and races than was found in those cities where the added population was largely of the same nationality and race as were the first residents. The tendency for the central parts of great cities to decline in population while the number of persons on the periphery increases is a world-wide phenomenon of neighborhood change.

The physical growth of cities is measured chiefly by the addition of new buildings and not by the growth of population. Despite a marked growth or contraction in the number of residents, the external appearance of the city may not be greatly altered. In the first case the existing structures are overcrowded with much doubling up of families; in the other case there are many vacancies in these structures. The ebb and flow of the population tide, however, tends to affect the volume of the production of buildings in a cycle that follows the population cycle. In periods of active building, rows of new homes are erected on the fringe of the city, creating new neighborhoods, and few if any houses are erected in the old neighborhoods. Even when there are vacant lots available in these areas, new structures built upon them may lose a considerable part of their value early because their surroundings are decadent.

As a result of the tendency of cities to add successive rings of new residential structures by a series of spurts, there may be a considerable time lag between the ages of successive neighborhoods. A community of new homes built during the crest of one building boom may have no competition as a result of a following lull in construction. In the next building boom some years later, other communities with homes in a newer and later style will tend to relegate this earlier crop of houses to a lower grade. On the other hand, neighborhoods in which the homes are built all at one time and of similar worth may have greater stability in value than neighborhoods in which houses are built at different periods of time and represent markedly different worth.

In any town it is interesting to trace the direction of the growth of the residential part of the city and the consequent advance of high land values from place to place. In a small Midwestern city fine old residences still sit in the midst of expansive lawns a few blocks from the main business section. At the edge of town near a college a counter development grew up at about the same time and a few monuments to that age still remain. As the college gained in importance more dwellings grew around it, and desirable residences were built farther from the business district. Then came a period when large boarding and rooming houses sprang up near the college and midway to downtown. After a time a part of the population desired to live within a few blocks of the business district and another part desired to live near the college, and so multifamily houses were erected near each of these places and detached houses rented and sold at a high rate. Finally, all the intervening spaces were filled, in selective order, some places with excellent structures and others with ordinary or less than ordinary dwellings. The spaces near the business section and the railroad tracks became the slums of the city. Then because most of the desirable places in the city were taken and there was danger of overcrowding, the city government set up a city-planning commission and enacted a zoning ordinance. An undeveloped area on high hills was made a restricted district where dwellings of only certain superior qualities and style of architecture could be erected and because of the desirability of the lots, the land costs were high. Thus the city had grown in a new direction with the accompanying increase in land values. This is a small city and its almost wholly uncharted progress has not been entirely disastrous, although a little foresight might have established heavy traffic lanes more advantageously and disposed of the surface drainage more comfortably.

On the one hand, then, there appears to be a set of principles which tend to influence the extent and direction of city growth. Uncontrolled growth may result in tendencies to scatter business and industrial activities indiscriminately and in the lack of adequate protection of the amenities of residential areas. On the other hand, a strong program of city planning tends to restrain undesirable growth and aims to encourage suitable expansion. It tends to regulate and stabilize value of land in certain regions and to direct migrations with due regard for future city growth. City planning can be used to produce greater fixation of urban areas based upon a balanced distribution of the probable future population.

A number of different types of planning efforts are extant, but usually the chief emphasis in any kind of city plan will be on the following matters.[1]

1. Ways of Communication:
    - (a) Railroad extensions and terminals; harbors and water fronts; airplane landing fields; transit lines and street railroads.
    - (b) New highways, speedways, parkways, and streets; improvement of alignment, width, and connections of existing highways and streets; approaches to and from the center of towns and to and from railroad terminals; bridges and subways; by-pass roads; treatment of intersections of main thoroughfares.
    - (c) Co-ordination of transportation, transit, and traffic facilities.
2. Zoning and Land Uses:
    - (a) Designation of areas for different uses such as residence, industry, business, and open development uses (agriculture and so forth).
    - (b) Designation of parts of residential areas for different types of dwelling such as single family (detached), two-family (semidetached or one above the other), groups or rows, and apartment dwellings.
    - (c) Restrictions affecting heights and densities of buildings, degrees of coverage (area of occupancy) of lots, building setbacks, and court space, and position of building lines.
3. Open Spaces and Preservation of Amenities:

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[1] Thomas Adams, *Outline of Town and City Planning*, pp. 297–298. Russell Sage Foundation, New York, 1935.

  (a) Designation of areas for regional and city parks, athletic fields, playgrounds and other open spaces, public and private.
  (b) Preservation of historic buildings and places of natural beauty and proposals for architectural control.
  (c) Regulation of the erection of temporary structures, including billboards and gasoline filling-stations.
4. Control of Land Subdivision and Determination of Sites for Civic Centers and Other Local Developments.
  (a) Restrictions affecting the subdivision of land into streets, blocks, and lots.
  (b) Selection of sites for supplementary planning as neighborhood units or residential estates and civic or transportation centers.
  (c) Proposals for the development of satellite communities.

In brief, then, a city plan deals with its streets, highways, and the public transportation system; with uses made of its land for residential, business, or industrial purposes; with its parks and public buildings; and with development of new neighborhoods. The family attempting to select the neighborhood where its home is to be must interpret what the town or city has to offer in these items in terms of what it needs to carry on its life. Its members need to look at the plan of the city and study its growth to determine the location of the neighborhood; they need to study the layout of its streets and the nature of its blocks; they need to investigate its zoning ordinances and neighborhood facilities and utilities.

If a city includes many square miles of area, it subdivides itself into various convenient neighborhood units, each of which is a more or less self-contained entity having its own shops, churches, schools, parks, and playgrounds as well as homes. In planned cities subdividers may be required to plot new areas according to model regulations which preserve residence amenities. These should properly lie between main traffic ways and should provide a plan of streets which contribute to safety from traffic hazards within, and take advantage of existing natural beauty.

Both natural and man-made features which exist in a vicinity should be considered. Views of bodies of water or highlands are desirable but waste lands should be avoided. Heavy industry in the direction of prevailing winds may be objectionable because of noise, smoke, or odors, but a light industry may be desirable if it provides work near to the home.

Transportation either by public carrier or private means to place of employment, to school, and to community and shopping centers must always be considered when choosing a neighborhood. Facilities by public carrier such as rapid transit lines, street railways and bus lines should be modern, convenient, and have frequent service. If private means of transportation are used, arterial highways and access to through streets are important, especially if the neighborhood chosen is at a distance from the place of employment, school, community and shopping centers, as in the suburbs.

A classification of, and standards for, the streets of incorporated cities and villages are necessary to understanding them. From the standpoint of use these streets are thoroughfares, commercial streets, industrial streets, and residential streets.[1] The thoroughfare or arterial highway is primarily for through traffic and for this reason should be wide and kept as free from obstruction as possible. Frontage on a through-traffic street is not desirable for homes, unless they are in multifamily dwellings provided with ample side parking space. Commercial or business streets should be properly articulated with, but not part of, main thoroughfares. It should be possible to find a way into them and through them from the main thoroughfares. They need plenty of shade, liberal sidewalks, and sufficient parking areas adjoining them. Neighborhood business streets of a minor nature are needed in residential areas so that family requirements may be conveniently supplied. Industrial streets should be easily accessible from, but not coincident with, through traffic streets. There should be trees and plantings wherever the presence of smoke, dust, or fumes allows their growth.

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[1] Reported in *Planning for Residential Districts*, p. 181, vol. 1. The President's Conference on Home Building and Home Ownership, Washington, D. C., 1932.

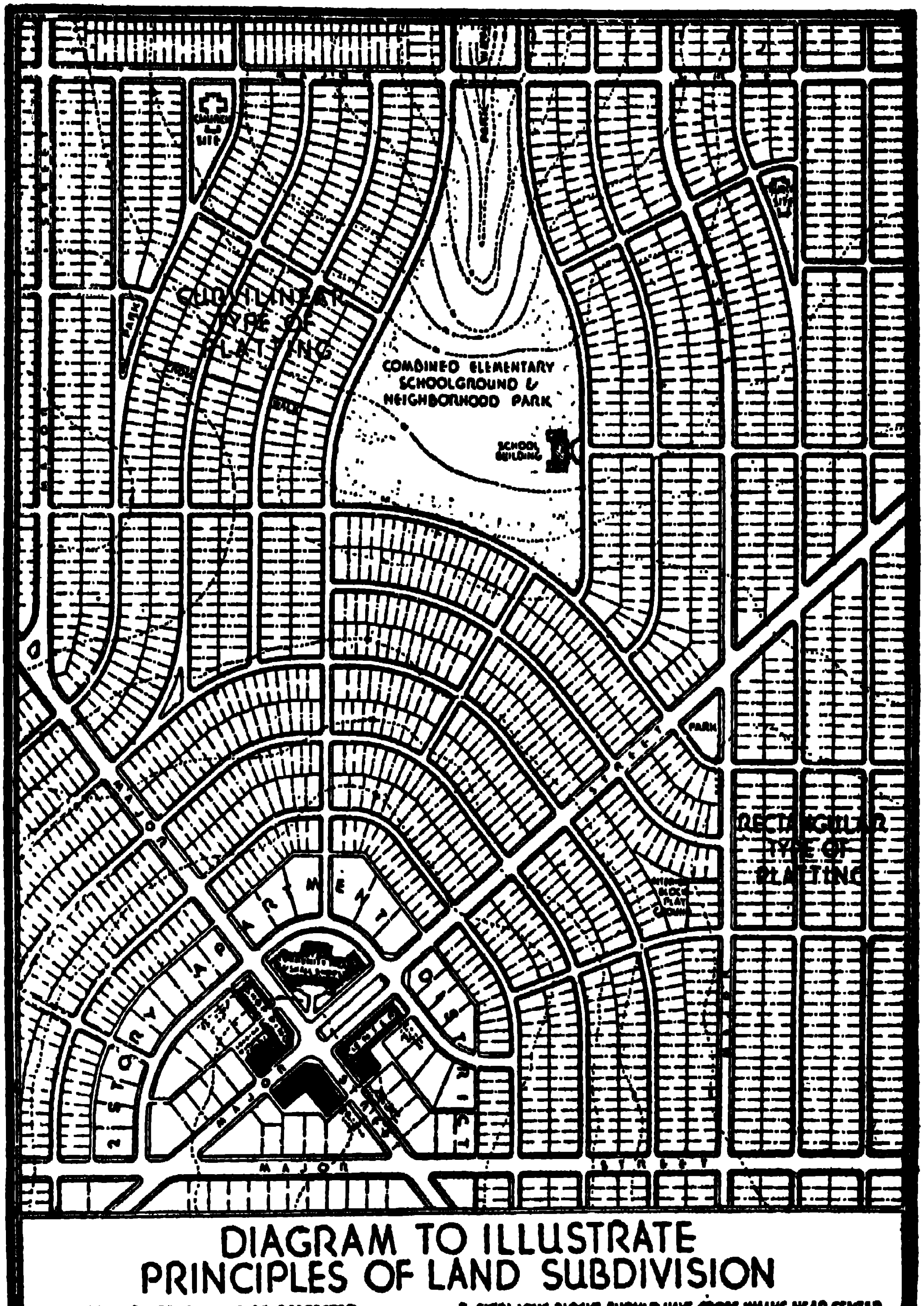
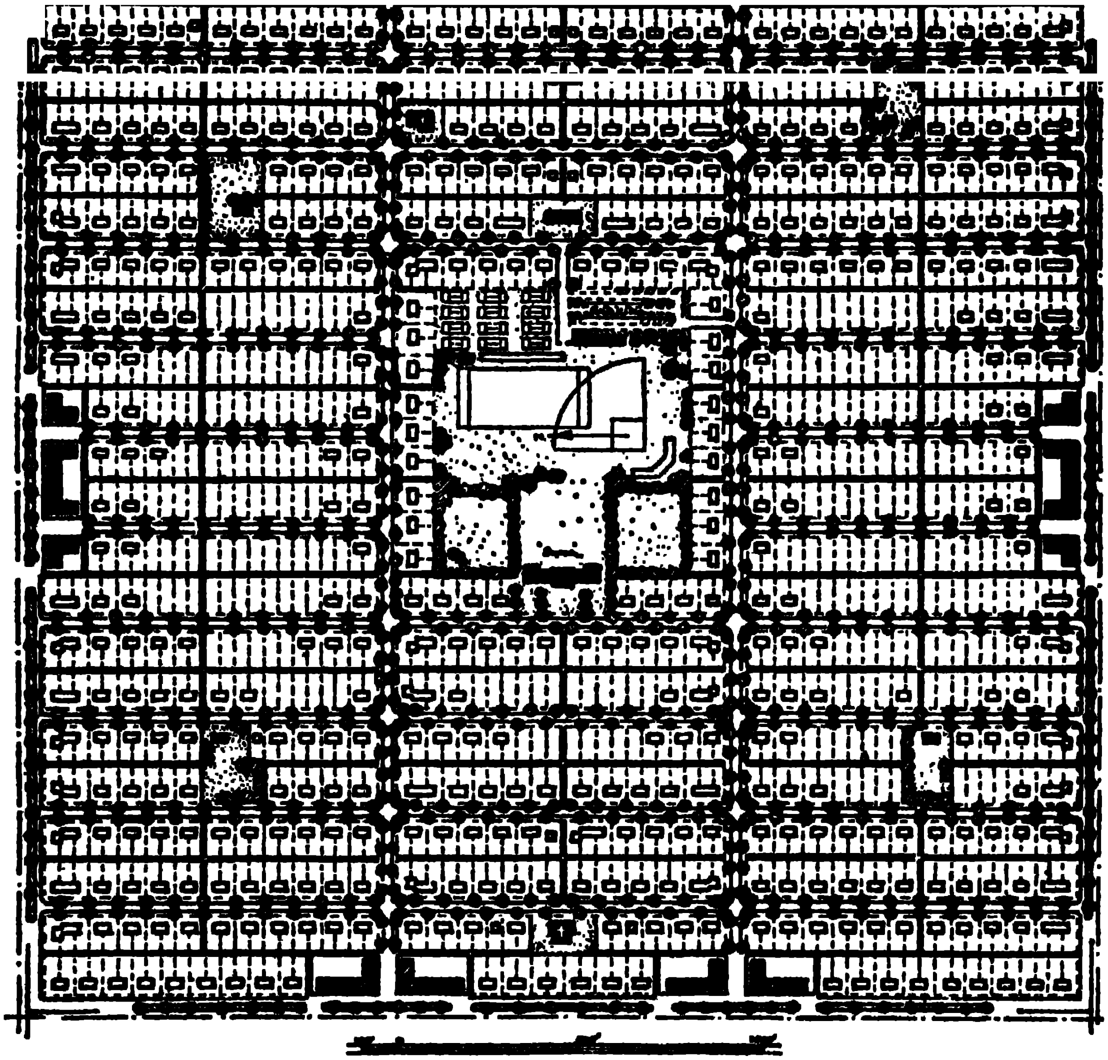

CHURCH SITE
CURVILINEAR TYPE OF PLATTING
COMBINED ELEMENTARY SCHOOLGROUND & NEIGHBORHOOD PARK
SCHOOL BUILDING
PARK
RECTANGULAR TYPE OF PLATTING
2 STORY APARTMENT DISTRICT
MAJOR STREET
MAJOR STREET

DIAGRAM TO ILLUSTRATE PRINCIPLES OF LAND SUBDIVISION

1 MAJOR STREETS SHOULD BE RESPECTED
2 STREETS SHOULD FIT CONTOURS
3 TRAFFIC SHOULD FLOW TOWARD THOROUGHFARES
4 MAKE MINOR STREETS UNSUITABLE AS THOROUGHFARES
5 PLAN COMMERCIAL SITES AT IMPORTANT INTERSECTIONS
6 CORNER LOTS SHOULD HAVE EXTRA WIDTH
7 EXTRA LONG BLOCKS SHOULD HAVE CROSS WALKS NEAR CENTER
8 RESERVE RUGGED AREA AS PARK
9 PROVIDE SCHOOL & CHURCH SITES
10 AVOID SHARP-ANGLED LOTS
11 LOT LINES SHOULD BE PERPENDICULAR TO STREET
12 OMIT ALLEYS EXCEPT IN COMMERCIAL & APARTMENT DISTRICTS

BARTHOLOMEW & ASSOCIATES
CITY PLAN & LANDSCAPE ENGINEERS
SAINT LOUIS – MISSOURI

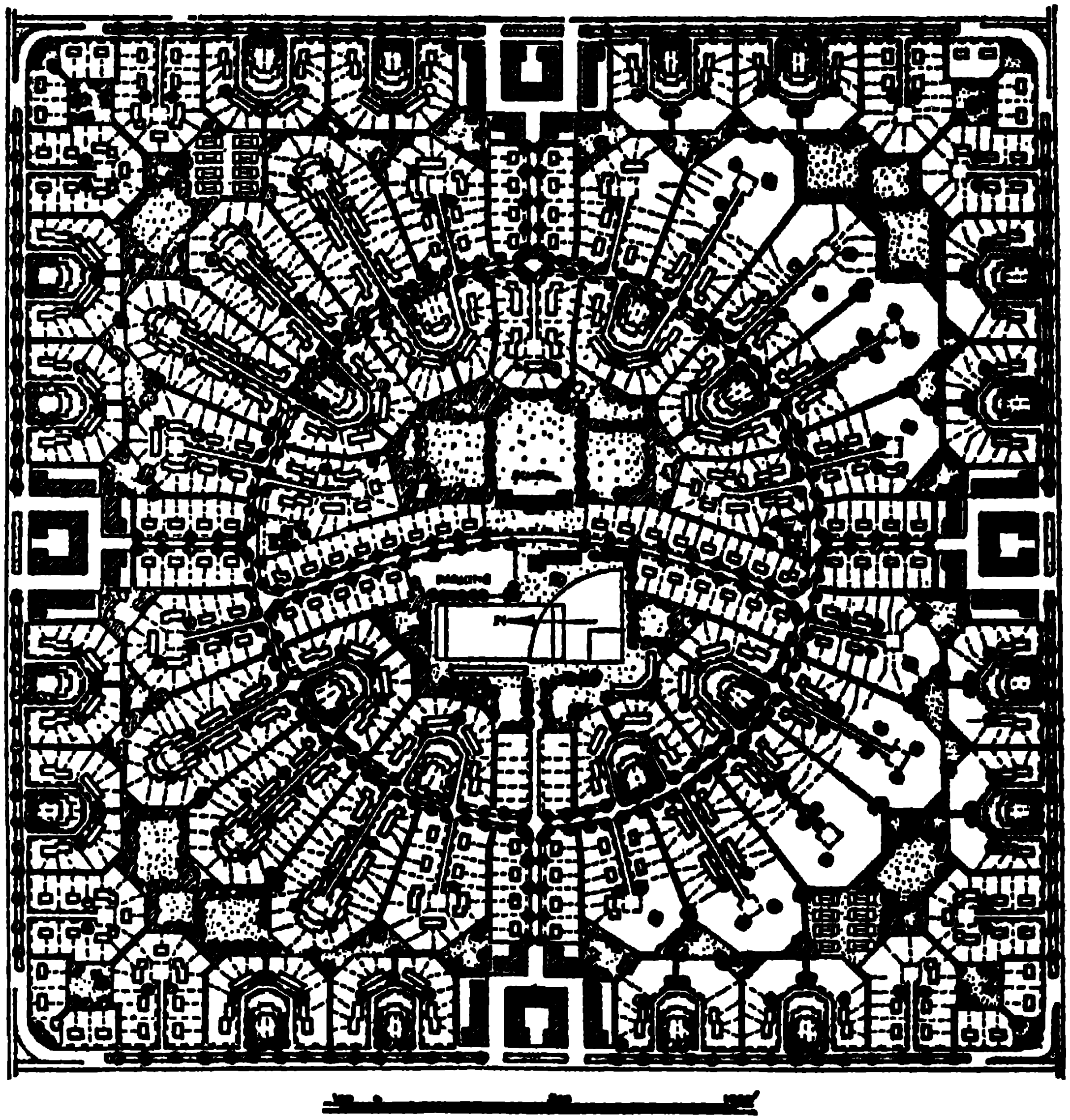
Courtesy Conference on Home Building and Home Ownership



Courtesy Conference on Home Building and Home Ownership

Subdivision layout having a gridiron pattern.

Residential streets should be located and designed so as to discourage through traffic. Those developed on a community or neighborhood basis off from main thoroughfares accomplish this purpose. Sidewalks paralleling the streets and other footways provided at convenient points allow more direct communication for pedestrians than for vehicles. Plenty of shade should be provided along residential streets. The traditional arrangement of streets is the gridiron pattern. This utilizes land to a great extent, supplies many cross-access streets, but leaves little free open space. A more recent devel-



Courtesy Conference on Home Building and Home Ownership

Subdivision layout having a Cul-de-sac loop pattern.

opment fits the streets to any irregularities in the terrain, thus providing easier grades, saving on construction costs, allowing for open park spaces at suitable places, and permitting larger blocks. When feasible, residential streets should run so as to afford a maximum penetration of sunshine to homes. This is obtained when streets do not deviate more than ten degrees from the north and south line. In order to control traffic or provide good subdivision among the properties, court, dead end, or cul-de-sac streets are sometimes used. Such streets should allow room for firetrucks or moving vans to turn at the

Courtesy Buhl Foundation, Pittsburgh

Family dwellings may be built around a superblock with traffic by-passed through main thoroughfares.

closed ends. Primary streets are usually 60 to 80 feet in width, and secondary streets are from 30 to 60 feet. An 18 to 20 foot paved roadway is sufficient for local needs with the rest being used for sidewalks and strips planted with grass, shrubs, and trees.

The blocks made when the subdivision is cut by streets should be planned carefully for size and shape. Long blocks from 800 to 1200 feet in length are desirable as they result in fewer traffic intersections, reduce the accident hazard, and make possible the placement of houses near the street, thus leaving large inside spaces for play and recreation. The long axis of the block should be in the direction of traffic movement. Sometimes there are cross pathways 10 to 15 feet wide midway of the block for pedestrians. The building lots should be wide enough for the house and garage or not less than 40 feet for the detached house; not less than 30 feet for semidetached houses; and not less than 16 to 18 feet for each row house.

The services offered to homes in the form of fire and police protection and sanitation provisions are also important factors in choosing the neighborhood for the home. Adequate fire plugs located near enough to service properly each lot are important. A police organization which permits a watch system at least during certain seasons, as at vacation times, safeguards against petty thieving and burglary. An ample supply of street lights and telephone and electric service should be readily available in the neighborhood. Effective sanitary regulations regarding the collection and disposal of garbage and trash, the blotting out of stagnant water and other health hazards, as well as an adequate supply of pure running water and sewage disposal are requisites in the selection of the location of the home.

A good neighborhood includes schools, churches, and other recreational areas. A neighborhood center and a shopping district should be near by, that is, within walking distance of the home. This is commonly construed as within a radius of a quarter to a half mile. The shopping center should be confined within a certain territory, and its general character should be such as to safeguard the value of nearby residential properties. Adequate parking space should be provided off the main streets. In addition, an adequate medical service and nearby hospital facilities are important facilities to consider in selecting a neighborhood.

A grade school is a natural center of a neighborhood. In addition to providing adequate space for play and carrying out the child's curriculum, there should be facilities for adult education and neighborhood activities. In general, it should be within a distance of one-fourth mile from the home and accessible to it without crossing a main thoroughfare at grade.

Not less than 10 per cent of the area of the entire municipality should be devoted to public open spaces other than streets. These park areas offer what individual homes lack in space for games and recreation.

Another item of importance to investigate when choosing a neighborhood is the extent of zoning ordinances for the protection of the homeowner. When properly written and carefully enforced, they limit the uses to which buildings can be put and limit building heights and land coverage. Thus, ample space between houses insures light and air for the house. Local deed restrictions, building codes, and health and sanitary ordinances may provide added protection.

Not less important than the items listed as important in the neighborhood are the people themselves. The homeowner should determine whether they have interests in common with those of his family, whether they are stable people, whether they maintain their properties at standards he admires.

There are certain special considerations, not necessarily of concern to the whole city, which the family interested in a home site should bear in mind. These are the possible freedom from constant and irksome noise, the prospect of adequate sunlight, and the protection given against certain nuisances.

It is said that one of the menaces to the effective rest and recreation in American homes today is the ever present noise that continually bombards the consciousness of the hearer, producing cumulative fatigue. The greatest proportion of damaging noises does not come from within houses, however, but from the outside. Much of this could be avoided by careful attention to the location of the home. If the site, favored for other reasons, is in a heavy traffic zone the house should be set well back on the lot and a floor plan chosen which would allow for adequate ventilation if only the rear windows are used. Wide parking should skirt such a heavy traffic zone, for vegetation tends to dampen sound waves. Noises are greatly increased by the reflection of sound waves from the hard surfaces of pavements and building walls. Limitation of the height of buildings is therefore also a means of noise reduction.

Flashing lights, whether of airports or automobiles, often prove as disturbing to rest as does noise. Houses built at the end of a turn in a street, while they may command an extensive view, often are found to be constantly invaded by light rays disturbing to rest and equanimity. Another important consideration in the choice of a site for a home is that it be such as to permit flooding the room with health-giving sunshine, which comes not as an invader but as a benison.

The trend of the city's growth, the manner of its design, and its facilities for transportation and traffic should influence to some extent the choice of a site and the amount to be paid for it. It is rarely possible to obtain all the desirable points in selecting the home site, and in deciding upon one of a number of possible places, that location should be selected which is best suited to the family's needs and desires. The possible freedom from noise and unpleasant flashing light, and the prospect of adequate sunshine should have special consideration in the choice of a home site.

Suggested Activities

1. Indicate how each of the following might affect the choice of the home site:
   (a) Land values
   (b) Future city growth
   (c) Transportation facilities
   (d) Fire and police protection
   (e) Sanitation provisions
   (f) Zoning ordinances and building restrictions
   (g) Condition of streets and roads
   (h) Desirability of the section of the city
   (i) Type of neighbors
2. Ascertain what zoning ordinances and what building restrictions are in force in your city.
3. List the advantages that city planning may bring to a community. What plans has your community for its city growth?
4. Is the immediate neighborhood in which you are living appreciating in value and appearance, is it depreciating, or does it seem to be at a standstill? State reasons for your belief.
5. Analyze the transportation, shopping, and recreation facilities of your neighborhood with reference to adequacy, accessibility, and convenience.

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Problem 3. HOW SHALL THE EXTERIOR DESIGN OF THE HOUSE BE CHOSEN?

When a house is to be built, for many people the exterior appearance is the deciding factor in their choice. When this method of choosing the design is followed, the necessary rooms are forced into the form indicated by the outside. A much better way is to decide first on the interior plan. This procedure should place the various rooms where they function to best advantage. It is then possible to fit to this scheme an outer wall and roof in such a manner that they will appear well and express the purpose of the rooms within. Obviously, when we consider the pattern of our present-day living, it is not likely that many exteriors will fall into a design of a former age in all details.

In order that a house may be continuously satisfactory, ostentatious or superfluous features must be eliminated and the building must conform to the essentials of good taste. The criteria of good taste in all buildings have been summed up in the following rules:

1. The building must fit its site.
2. The building must serve its purpose; it must be strong enough and look strong enough to withstand wind and weather.
3. A building must express its purpose.
4. A building must reflect the social conditions of the place and period of its construction.
5. A building must show its construction and be free from pretense.
6. Ornament must be structural and not applied.
7. Every detail must be in character with the whole.
8. The plans must be as direct and simple as possible, for the elevations grow out of the plan, and a well-balanced, harmonious structure cannot be built upon a confused, complex plan.[1]

Therefore, it is important that a house fit the needs of a family and conform to the rules of good taste rather than

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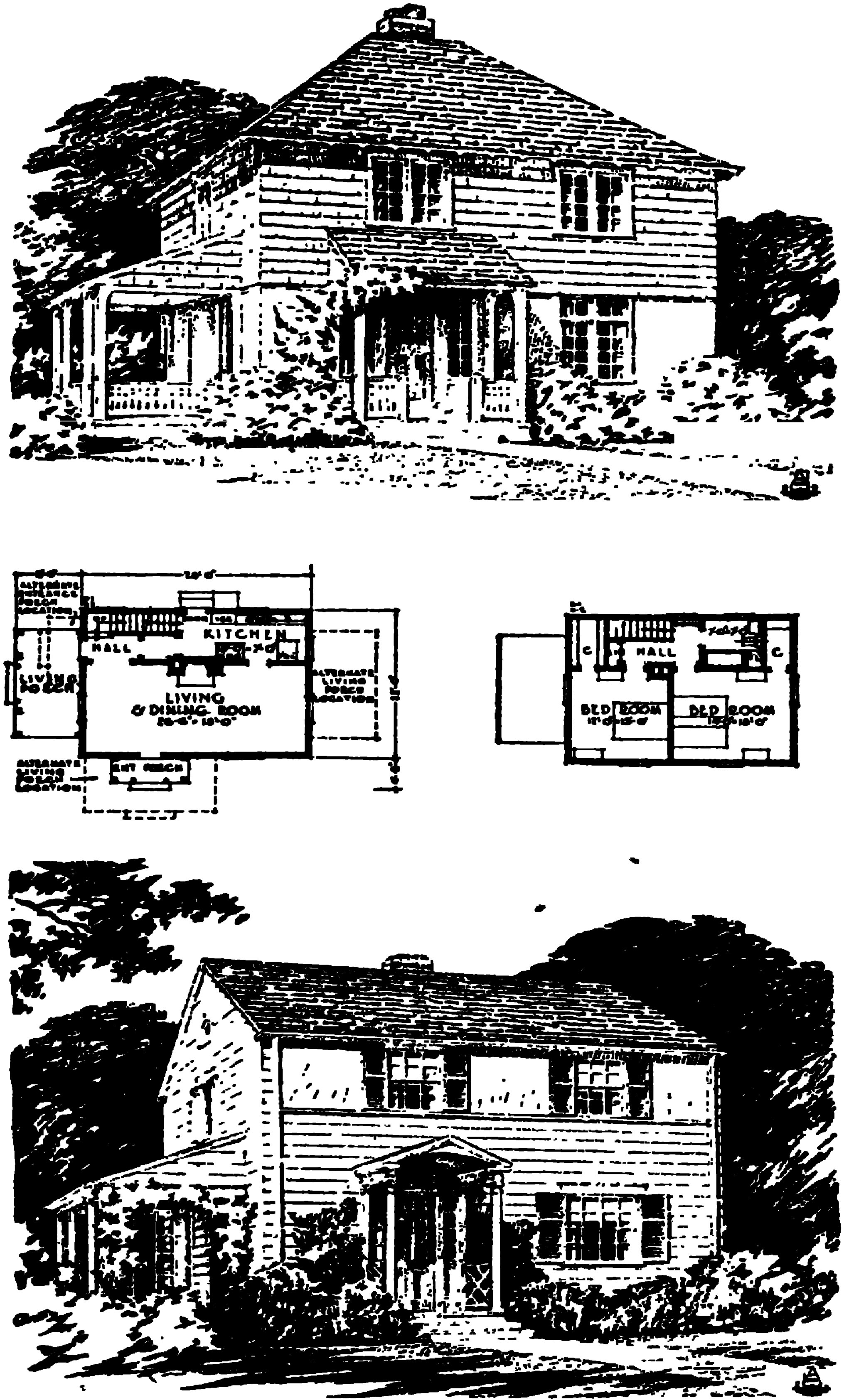
[1] Greta Gray, *House and Home,* Third Edition, revised, pp. 172–173. J. B. Lippincott Co., Chicago, 1935.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KITCHEN
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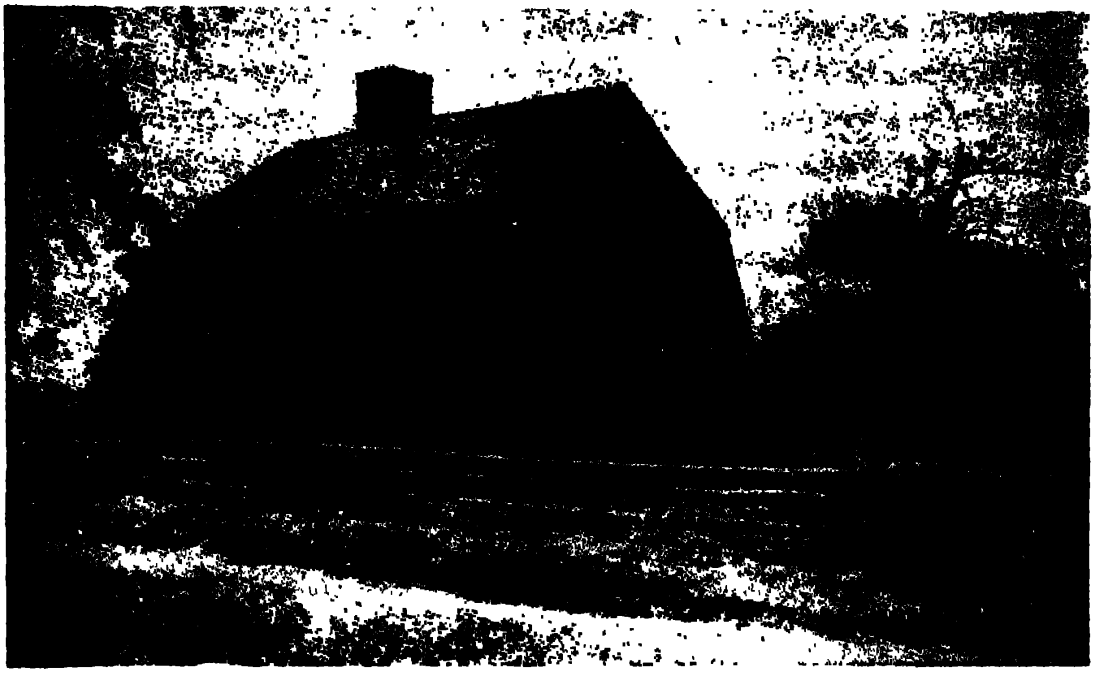
From *Small Homes of Architectural Distinction.* Courtesy Harper & Bros.

Several different exteriors may be developed for the one floor plan.



From *The Practical Book of Architecture.* Courtesy J. B. Lippincott Co.

Early American house.

slavishly follow the dictates of a particular style. In fact, most architects will agree that several different elevations can be drawn for any plan, but in most cases only one plan is really adapted to the requirements of any building.

For these reasons, there is a distinct tendency at present to get away from very much emphasis on style. Those houses called by the name of English, French, Spanish, or Colonial are beginning to have much in common. This characteristic in small house design is brought about by simple direct treatment devoid of useless ornament and complicated cornices. In a sense houses are becoming streamlined along with other things designed in this age. Eaves are close in. The gutter may form the cornice. The roof lines are simple. Adornment is limited to structural members such as a molded cornice, simply shaped handrails, and color carefully used on the roof, walls, and trim. Where formerly one window sufficed, a desire for an increased amount of light in all rooms results in a group of two, three, or possibly more windows in the present-day house.

So today, most new houses in America merely have dominant characteristics of a style, and those of pure architectural style are seldom found. Indeed, a skillful architect can, and often does, combine elements of several styles in a single dwelling. However, it may be desirable in some cases to render a house in a manner as true to a special style as possible, and so a consideration of the characteristics of domestic architectural style is in order.

The Colonial style of architecture is too often a misnomer applied to any house made with clapboards and painted white with green shutters. Colonial America had two varieties of architecture, one of which is properly called Colonial and the other Georgian. The first evolved its distinctive forms in America chiefly from dictates of local necessity; in contrast the second was transplanted directly from England and preserved almost an exact likeness to the parent stock from which it sprang. True Colonial architecture presents several distinctly different forms of local manifestations, each of which is profoundly characteristic. One form is to be found chiefly in New England. Another type is peculiar to parts of New York state settled at an early period by the Dutch Colonists, and to parts of Long Island where the Dutch influence was paramount. Still another and altogether distinct type of Colonial architecture is to be seen in the numerous examples in Pennsylvania, and parts of New Jersey and Delaware. A fourth type with yet another set of peculiarities, is to be found in Maryland, Virginia, and the Carolinas. The scarcity of examples in the last named section is explained by the fact that the Southern planter when his wealth was increased chose to live in a more sumptuous manner. Therefore, he built a stately Georgian home, better suited to the more elegant style.

The crude dwellings of the first few years of colonization need scarcely be considered, as they were soon replaced by more substantial structures. The common houses were first of one story, with sharp roofs, heavy stone chimneys and small diamond windows, although some of the early houses had two stories. One type of these small houses consisted of two rooms with a chimney between. The chimney which projected above the ridge pole was the core around which the house was built, and it afforded a fireplace to each room. A lean-to was usually added across the whole rear of the house. The overhang on the second floor projecting some distance beyond the walls of the first is a feature which was added later. This type of architecture is often called Cape Cod, Early American, or New England and it is one of the most comfortable and quaint of domestic architectural styles. At present, houses of this type are attractive when made of clapboards painted white with green shutters, solid or slit, and with a red brick fireplace at one end.

Not to be ignored as a style developed in this country is French style around the Louisiana country and in Mobile. Many of the homes in New Orleans combine home and business place. The office or counting house is on the street. Between buildings are portals which lead into a covered passageway and again through an archway into a courtyard which is surrounded on all four sides by walls giving shade most of the day. On the ground floor are the kitchen, slave quarters, and stable. A grilled doorway leads to the main stair hall, and the living rooms are reached on the second floor up a winding stair. In the paved patio are flowers, shrubs, and a fountain. New Orleans is famous for its quaint façades, ornamented with balconies and grills. The ironwork was added by the Spaniards and made by their African slaves.

The Dutch house in America is to be found in the valley of the Hudson, in Long Island, and parts of New Jersey, but the purest forms are to be found along the Hudson. They were built by the Dutch and while there is nothing analogous to them in Holland, they reflect the thrifty characteristics of the Dutch who succeeded in enclosing more space with less waste in their houses than did any other of the colonists. The materials in these houses differed. Although brick was the material the Dutch preferred to use, with their natural thrift and common sense they used stone and wood combined. The stone was sometimes left rough, but at other times it was carefully squared and dressed. The wood was dressed like modern clapboarding.

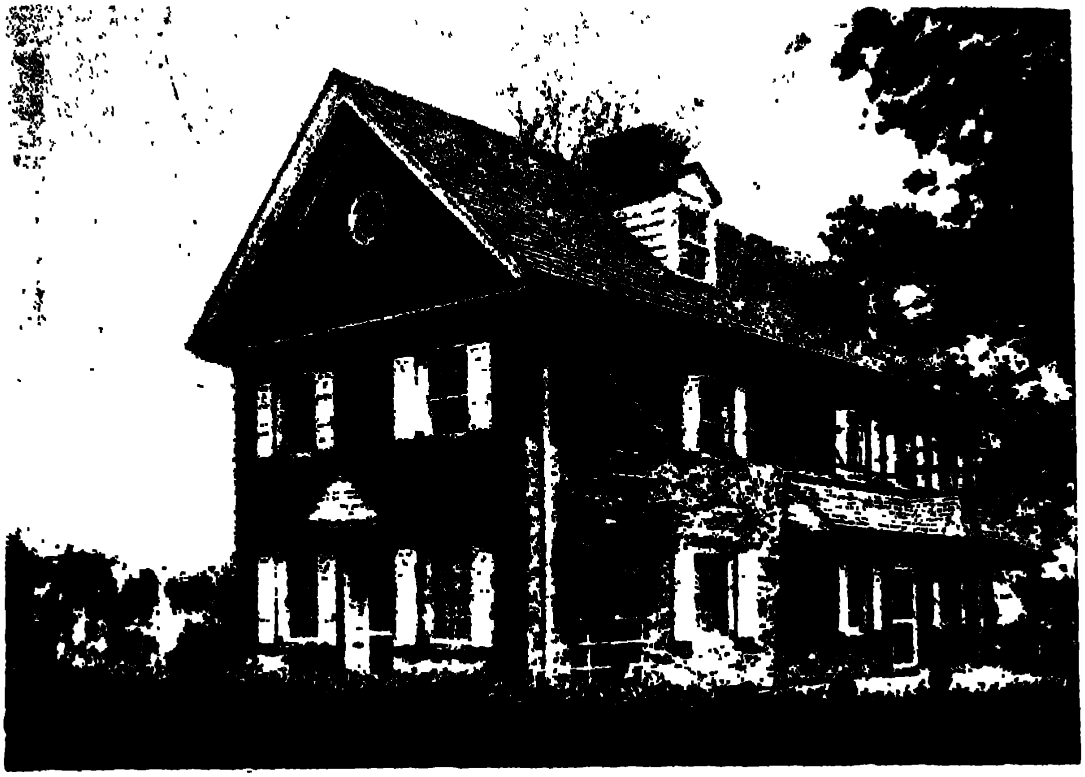
An examination of the earliest Dutch houses discloses the following features of importance: Almost all of the houses

Courtesy University Prints

Dutch Colonial house.

were low, the eaves coming down to within a few inches of the top of the first-floor windows. Often the roofs were unbroken by dormers, as the garrets were used chiefly for storage purposes. Later, dormers were added, for bedrooms were changed from the first floor to the garret. The gambrel roof was of later evolution. In the older houses the gambrel roof pitch is never steep, and the contour presents somewhat the lines of a flaring bell, an effect which is quite pleasing. The shutters were usually plain with saw cuts at the top in any pattern from half-moons to tulips. Shutters of a later period were panelled. This type has been adopted all over the United States as a type of domestic architecture. It is abused, however, when an ugly line is made of the gambrel roof, which should be long and flowing.

In the part of Pennsylvania where the Germans settled, we find an individual type of Colonial architecture, known as



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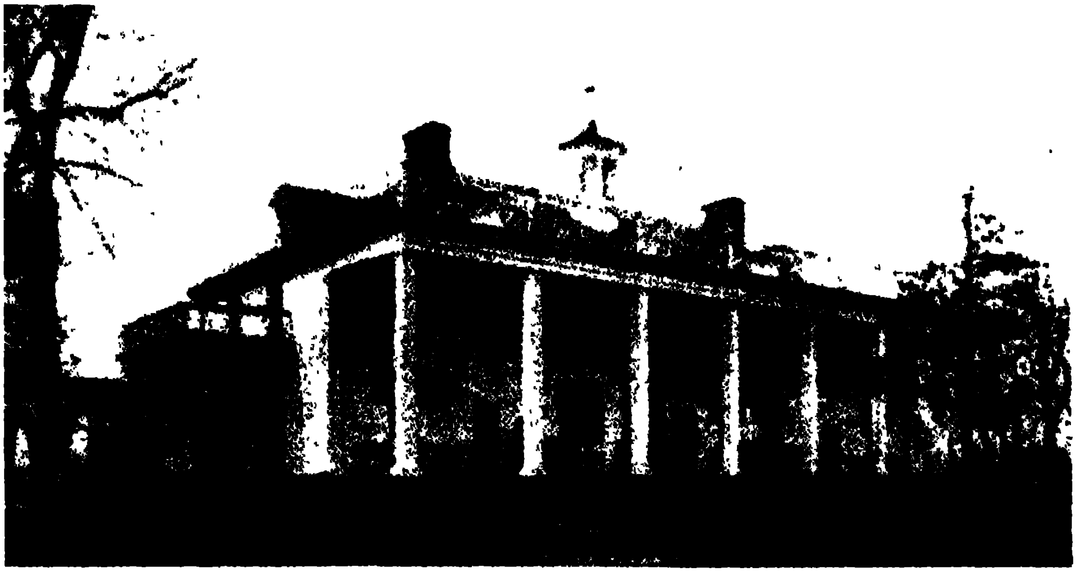
Pennsylvania Colonial house.

the Pennsylvania type. The masonry of the Pennsylvania Colonial type has been admired by architects from all parts of the country. The houses were built of local stone lined with white mortar. This was called liege stone. White woodwork, a feature of this type of house, was used around the doors and windows, and in the cornice around the eaves. Often there is a marked line separating the first from the second story, and wings may have been added to a small house as needed. Quaint hoods made either of wood or stone are often found over the doors and windows. This style of architecture is well adapted to any part of the country, and is being used to a larger extent now than formerly, largely because of its sound qualities and general attractiveness.

The greater part of the population of the South, like that of New England, was English to the core, and so was the architecture. Notwithstanding his inherited preference for stone and brick, the early Virginia colonist from necessity used wood largely, although when possible brick and stone



Courtesy University Prints

Mount Vernon is an excellent example of a Southern style.

were used. The earliest Southern houses in Virginia, after the brief log cabin stage, were of wooden construction with brick and sometimes stone chimneys, which were built on the outside of the house. It was only at first, however, that there was a scarcity of brick, for the difficulty in obtaining it was a matter of transportation rather than of supply.

For the most part the houses of even the richest planters were simple in plan and plain in appearance. The typical dwelling was an oblong structure with a steep-pitched roof, a chimney at each end, and the door in the middle of the long front. The pitch of the roof resembled that of the early New England roofs, but as the years went by, there was a general tendency for the roofs to become flat. In this connection it should be observed that the houses in New England needed steep roofs to shed the snow, while farther south there was no need for this. Another notable feature of these early Southern houses is the long dormer with peaked gables that often pierced the roof, in contrast to the rarity of dormers in the New England houses. The windows were geometrically spaced with either slit or solid shutters. Later, such details as the pillared porch, the pillars running either to the top of the first story or to the top of the house, were introduced. We seem to associate tall, white-pillared porches with long, warm

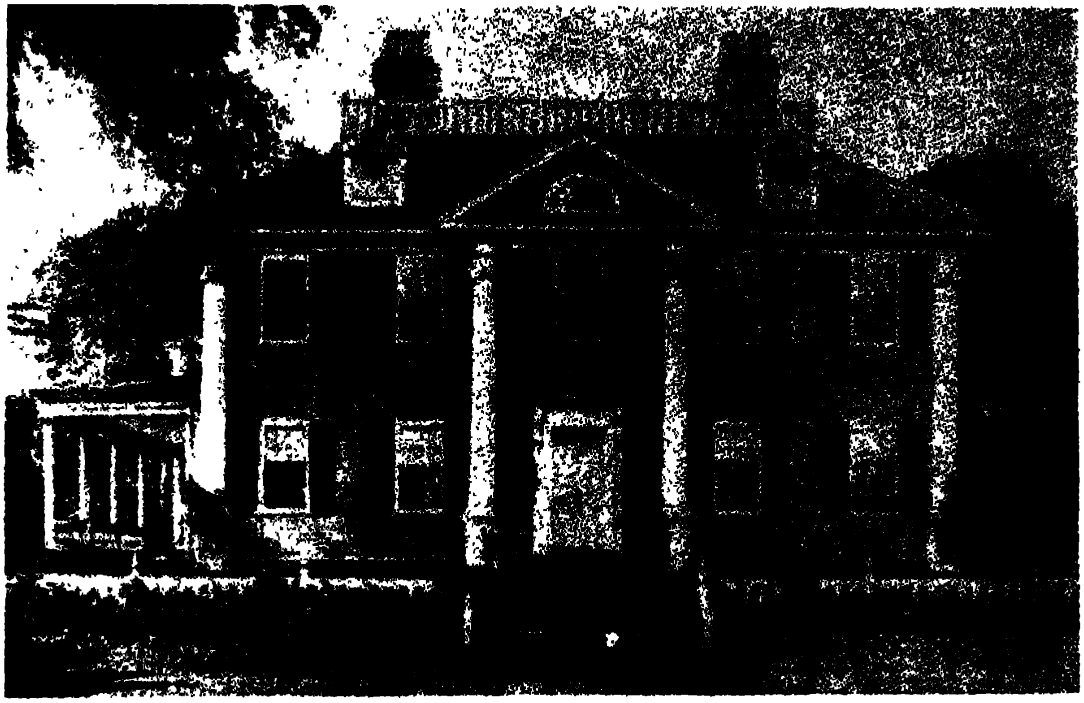
Courtesy *Ladies Home Journal*

One type of Southern architecture.

summer evenings and balmy breezes; southern Colonial architecture lends itself most admirably to the states where it originated.

Another type of architecture developed in the South, in and around New Orleans, has been called the "Creole" type. Here the influence of the French is felt. The roof and pillars are much the same as in the other southern type, but the people of this section were not as conservative as the English settlers in Virginia, and more decoration is found on their houses, especially around the porches. They often had the columns divided at the top of the second story, making two porches across the front of the house. The Colonial mode of expression as exemplified in the architecture of early New England, New York, or the South was traditional in whatever local differences it might exhibit. It was folk growth, much of it brought over from the old country, some of it made here in the New World.

Georgian architecture, on the other hand, echoed the spirit



Courtesy University Prints

A house showing Georgian influence.

of the Renaissance. It breathed the atmosphere of well-ordered classicism, inspired by the masterpieces of Greek and Roman antiquity. It was essentially the architecture of the well-to-do, polished and somewhat artificial. By the end of the first quarter of the eighteenth century, there was a marked increase in the wealth of the country. Indians were banished to the west, and, in general, conditions were satisfactory for the building of a more pretentious style of architecture.

Authors divide the Georgian period into three parts, each following the other chronologically, but for our purpose these will all be considered together, for parts of each are used so often in copies of this type. The roofs might be steep pitched as in the early New England houses, or they might come up at a pitch on all four sides of the two-storied houses, and then be completely flat across the top, or all four sides join at the top in a peak. These houses are more nearly square than any of the other early types. Rich ornament, reflective of the wealth of the period, was widely used. Doorways were richly ornamented with fan-shaped windows above the top, and heavy mouldings and cornices adorned the eaves. Pillars and pilasters were lengthened and imparted a slender grace to the porticoes. Sometimes heavy stone quoins were used at the corners of the houses. The portico became an important part of architecture in the Georgian mode. Porticoes were formed by great pillars built out from the house supporting a massive pediment richly ornamented with cornices and wreaths. Georgian architecture is used extensively today and is improperly called Colonial by many. It is easily adapted to any part of the country and makes an attractive, roomy home.

Our heritage from England is rich in architecture as in many other things. Although some types from England were not much used in this country until the middle or latter part of the nineteenth century, various English styles are now to be found all over the country. The English style was evolved through the "Keep," the "Hall," and the "Manor." The "Keep" was a fortress-like affair built in feudal times. Its walls were thick, relieved by a few unglazed windows, which let in only scant light. It was surrounded by a deep moat over which a draw-bridge permitted contact with the outside world. The "Hall" type of house was used immediately preceding the Elizabethan development. Comfort and elegance were beginning to be more important than defense. Some attempts were made at architectural gardening. Throughout the Tudor period the "Hall" was gradually changing to the '"Manor" of Elizabethan and Jacobean times.

The Elizabethan "Manor" was made of local stone with heavy slate roof. Where stone was scarce, brick was used, reserving the available stone for the corners, and window and door openings. Lead was used for the flashings and rain leaders and for the casement windows. Half-timbered construction was a picturesque favorite and it reached a high stage of development during this period. The plaster houses had outer walls of plaster as the name suggests. In the early days the timbers were used as braces where they were most needed, as under a gable or window. Today, the timbers are used for accents in these same places. The Elizabethan dwellings were found to retain such Gothic features as towers and battlements, buttresses and mouldings, while at the same time in-

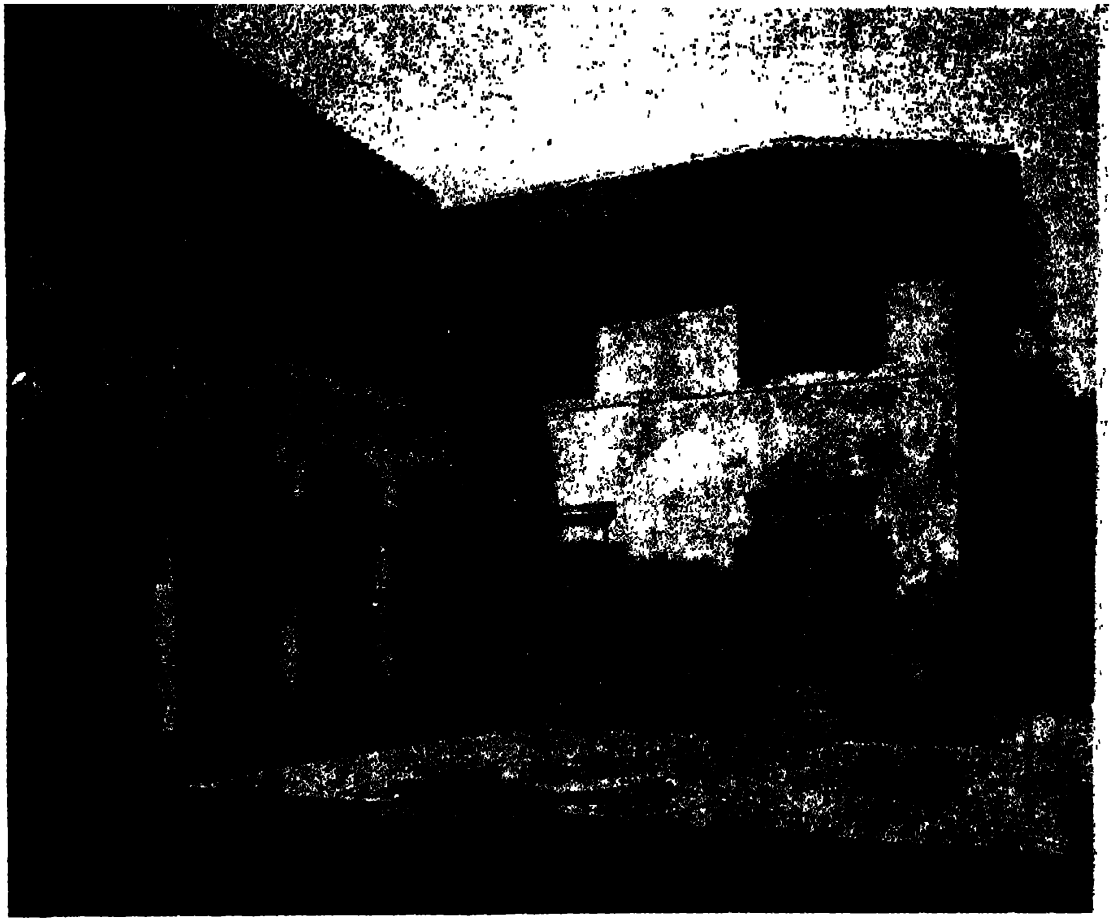
From *The Practical Book of Architecture.* Courtesy J. B. Lippincott Co.

English half-timber house.

troducing square-headed windows, gable ends, oriel windows, and large bay windows, all in leaded glass, with the sash of the casement type.

The Jacobean dwelling was developed along Elizabethan lines. The entrance door changed from barnlike battons into a heavily framed type. The entrance was further elaborated with columns or pilasters and a profusion of carving. The exteriors were enlivened by elaborate bay windows as well as by large groups of mullioned windows. Dwellings of this period were influenced by the Italian Renaissance ideas. A common Italian detail was the semigrotesque terminal figure, frequently used as a pilaster. These grotesque forms often appeared as finials. The typical Jacobean finial was a small, stunted obelisk commonly placed on the posts of garden terrace balustrades, on gates, and on gables.

The cottage type is the most interesting. It originated in rural England and has been given a most interesting inter-



From *The Practical Book of Architecture.* Courtesy J. B. Lippincott Co.

Home with Italian influence.

pretation in the United States. The English cottage in its native country is made entirely of stone, even the roof being made of thin slabs of slate. In this country this type is frequently found with the lower part of stone and the upper part of wood. Windows are placed with no particular idea in mind. They are added from the inside where they are needed, and luck is trusted to make the exterior appear attractive. The entrance way is recessed and little eaves extend over the doors and windows to shed the rain.

An outstanding type of architecture, characterized by a round tower, originated in France in the Feudal days. Today, any house with a round tower is definitely stamped as French-Normandy style. True to tradition, these towers often contain narrow slit windows, just as did the towers which, in the olden days, were used as watch towers and as vantage points from which to pour molten iron or lead. Steep-pitched roofs and small dormers are used as in English style. These houses are most appropriate when made of stone and are at their best on a large tract of land.

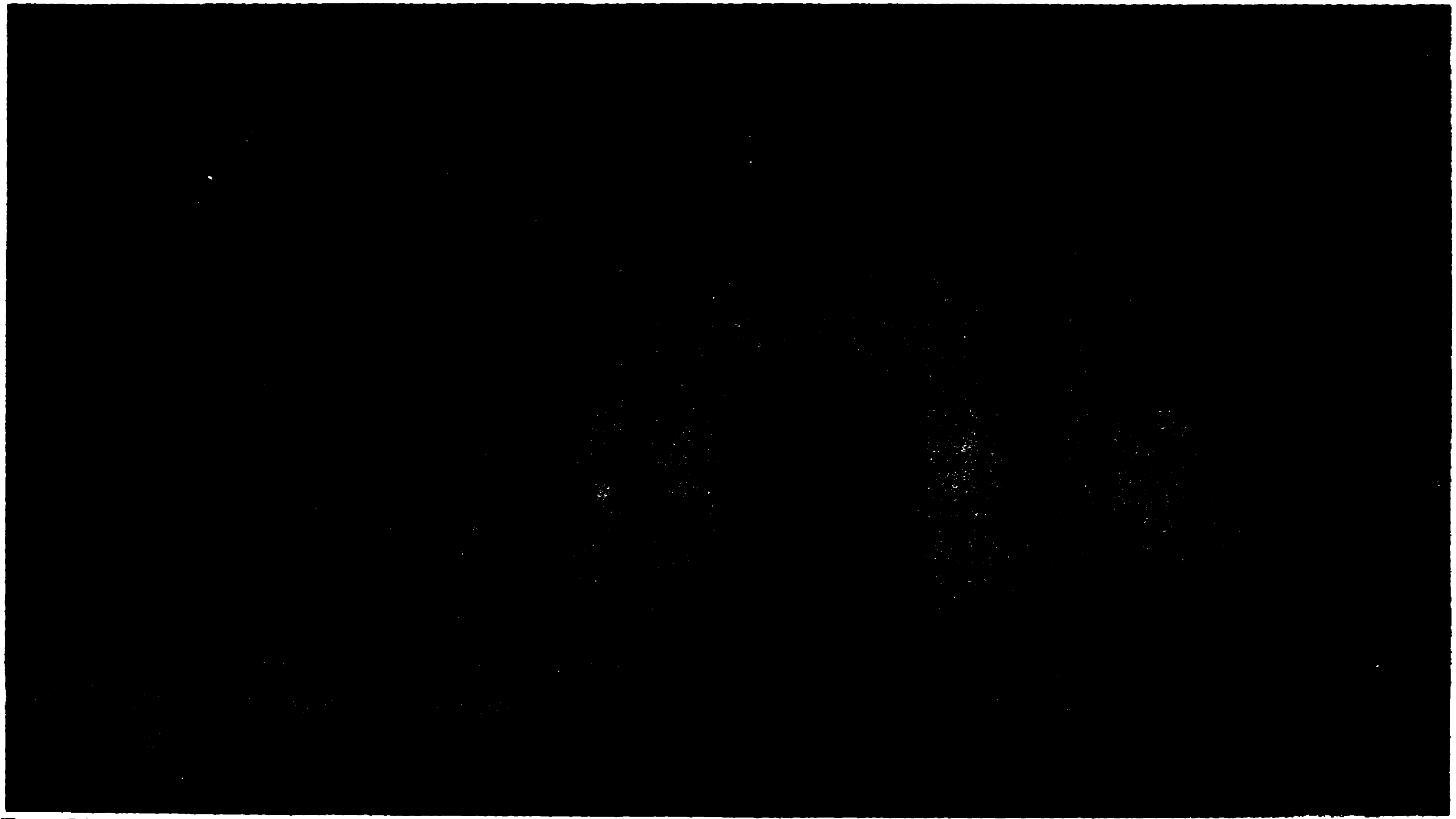
Spain and Italy are both Mediterranean countries, and although the types of Spanish and Italian architecture are often confused, in the pure type each has its similarities, as well as differences. For this reason, they are more easily discussed together.

The countries along the Mediterranean have one thing in common, the custom of living from the outside in, so to speak, or pulling the outdoors inside. The houses are arranged on the plan of the old Roman house whose principal room, the atrium, had a large opening in the roof for light, the other rooms being grouped around it. In these houses, however, the opening is a court, which not only furnishes light but also space for growing grass and plantings.

From this point, the Spanish and Italian houses have dissimilarities—characteristics brought about by racial, social, or climatic differences. The Italian houses tend toward a system of towers, with grouped hipped roofs, while Spanish houses are masses of long, low rectangles, often with gabled roofs. The Italians kept the court idea by having the principal living rooms overlook the extensive garden setting, but the Spanish house, in the true type, has the court in the center of the house. The Spanish court, or patio, is the center of the home life as well as the center of the building. It developed from the ever present danger of attack from without and the extreme aridity of the climate which makes protection from the sun imperative. The patio also provided for the forced seclusion of women, a requirement of the harem days of the Moors.

There are certain easily accounted for distinctions which exist in Italian and Spanish architecture. The Italian is painstaking, correct in the proportions of columns and entablatures; his ornament is always chaste and true to form. The Spaniard, on the other hand, is careless of form, disregards rules of art, often introduces fantastic ornament, but his innate sense of good taste usually produces good results.

In the Spanish house the door may be at one side, the windows grouped, but seldom in pairs or in even numbers. Ornament is rather sparingly used, and when used is concentrated



From *The Spanish House for America.* Courtesy J. B. Lippincott Co.

A forecourt in a house of Spanish influence. Note the jewel-like treatment of the entrance, and the bars over the windows on the first floor.

on windows and doors, and contrasts richly with the expanses of plain white-washed walls. Another feature of exterior treatment often used is the continuous row of arched or square openings of the same size. Spanish houses are also famous for their wrought-iron grilles and balconies. Italian houses sometimes use a little of these but do not achieve the beauty and artistic qualities that the Spanish contrive to do.

The Spanish house in America has undergone many and periodic changes, absorbing influences created purely by local conditions. With its introduction into Mexico, its exterior became a highly ornamented surface. As it progressed into California, its construction was somewhat changed, owing to the native material at hand. Wood instead of wrought iron was used for balcony rails and grilles. Today we find the Spanish house scattered throughout the Southwest in particular, and also farther north. The true Spanish style with an inner court is not well adapted to northern climate, but houses there may have some of the essential characteristics.

The distinctive qualities of the Spanish style may be summed up as follows: low buildings with heavy stucco-covered walls; low-pitched tile roofs with projecting eaves; belfries projecting above the roof and pierced with arched openings; an inner court surrounded by graceful arches; and windows enclosed with a wooden or iron grille.

In contrast to the Spanish house, the Italian house has formal arrangement of doors and windows. These houses are never built around a central court as are the Spanish houses. Although Spanish houses are rarely more than one story high, the rectangular-shaped Italian house is rarely less than two stories high, often surmounted at the center by a square masonry tower serving as a pigeon loft. This plan is impossible in modern style, and so the loft is made circular and it is used to enclose the stairway. Ornamentation below the overhanging eaves and a few formal balconies complete the decorations.

When Louis Sullivan, working in the first decades of steel construction, looked upon a naked girder and found it beautiful, the idea was born that "form follows function, function

Courtesy Kenneth Day, Architect

Modern style of domestic architecture.

creates form." The term "functionalism" was derived from this phrase, and from its interpretation has developed the Modern or International design.

Although commercial and industrial buildings have been designed with this idea in mind in this country, it has been left largely to the more socialized European countries to develop the private dwelling along functional lines. The Frenchman Le Corbusier styled the functional house developed in France as a "machine for living." Until recently, Frank Lloyd Wright was the only disciple of functionalism for family dwellings in America. This country, however, was not yet ready to accept his prairie style begun early in this century, hence but few such dwellings were erected. Now with the acceptance of the service of various machines in household production, urban America is predisposed to think

An interior of a modern house, showing an interesting blend of functional and traditional styles.

of domestic services as mechanical and as properly performed by automatic or semiautomatic devices. This has opened the way to the acceptance of a functional house design and one which can be prefabricated. Thus a design for a functional house, early presented to this country, is returned and is being further developed.

At present to say that a house is functional is merely to imply good communication facilities within the house, ample ventilation and simple structure frankly expressed. Its design is derived from principles that have been tested in commercial and industrial building, and the structural unit is the basis of its composition.

The modern house is constructed of steel, wood, concrete, or any other material available which fits into the scheme. It is often prefabricated and built as cheaply as possible. It consists of an assemblage of rooms whose character, requirements, and relationship to each other are determined by nonaesthetic considerations, and which vary in size and differ in purpose. No one façade is regarded as more important than any other. To many, bareness is its most offensive characteristic, but this is not essentially a basic principle of modern design. Because the weight in a steel building is concentrated at a few points, walls have merely the function of screens for privacy and fenestration can be in groups, at corners, or in ribbons of horizontal or vertical glass. Some attention has been paid lately to designing the façades.

The Modernist starts, not with an idea for a façade, but with information about the habits, hobbies, measurements, and personalities of his clients. When he has discovered the functions to be required of the structure, he determines the form in accordance with them. He avoids first arriving at a beautiful design and then forcing the family to make the best they can of it.

Suggested Activities

1. What examples of historic styles of houses are found in your locality? Which of these styles are suitable for your locality?
2. In what ways do the newer houses vary from strict historic style?
3. What advantages, if any, does the modern style have over historic style?

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Problem 4. HOW CAN AN ATTRACTIVE SETTING BE ATTAINED FOR THE HOUSE?

For many centuries the Chinese have held the concept that the house and its environment are one, and that in the development of a home from a house and garden there must be planning that creates a harmony out of the whole. Although it is acknowledged that the charm of the home lies in its originality, there is need for guidance in the expression thereof. The following ancient description of the ideal Chinese home and its environment was recently quoted by Lin Yutang. Perhaps it is needless to point out that a gate presupposes a wall:

> Inside the gate there is a footpath and the footpath must be winding. At the turning of the footpath there is an outdoor screen and the screen must be small. Behind the screen there is a terrace and the terrace must be level. On the banks of the terrace there are flowers and the flowers must be fresh. Beyond the flowers is a wall and the wall must be low. By the side of the wall, there is a pine tree and the pine tree must be old. At the foot of the pine tree there are rocks and the rocks must be quaint. Over the rocks there is a pavilion and the pavilion must be simple. Behind the pavilion are bamboos and the bamboos must be thin and sparse. At the end of the bamboos there is a house and the house must be secluded. By the side of the house there is a road and the road must branch off. At the point where several roads come together there is a bridge and the bridge must be tantalizing to cross. At the end of the bridge there are trees and the trees must be tall. In the shade of the trees there is grass and the grass must be green. Above the grass plot there is a ditch and the ditch must be slender. At the top of the ditch there is a spring and the spring must gurgle. Above the spring there is a hill and the hill must be deep. Below the hill there is a hall and the hall must be square. At the corner of the hall there is a vegetable garden and the vegetable garden must be big.[1]

A list of "musts" made for the setting of a home in America might differ from that for a home in China. Thoughtful deliberation should be given to many items in the event of the purchase of a home, or of planning the setting for a new one. In this country the "musts" that prevail in the choice of a setting for a home, although not exactly the same as those that seem important to the Chinese, have tended to be as specific. There must be a scrap of a lawn; there must be a walk leading to the entry; and until recently, there must be a front piazza.

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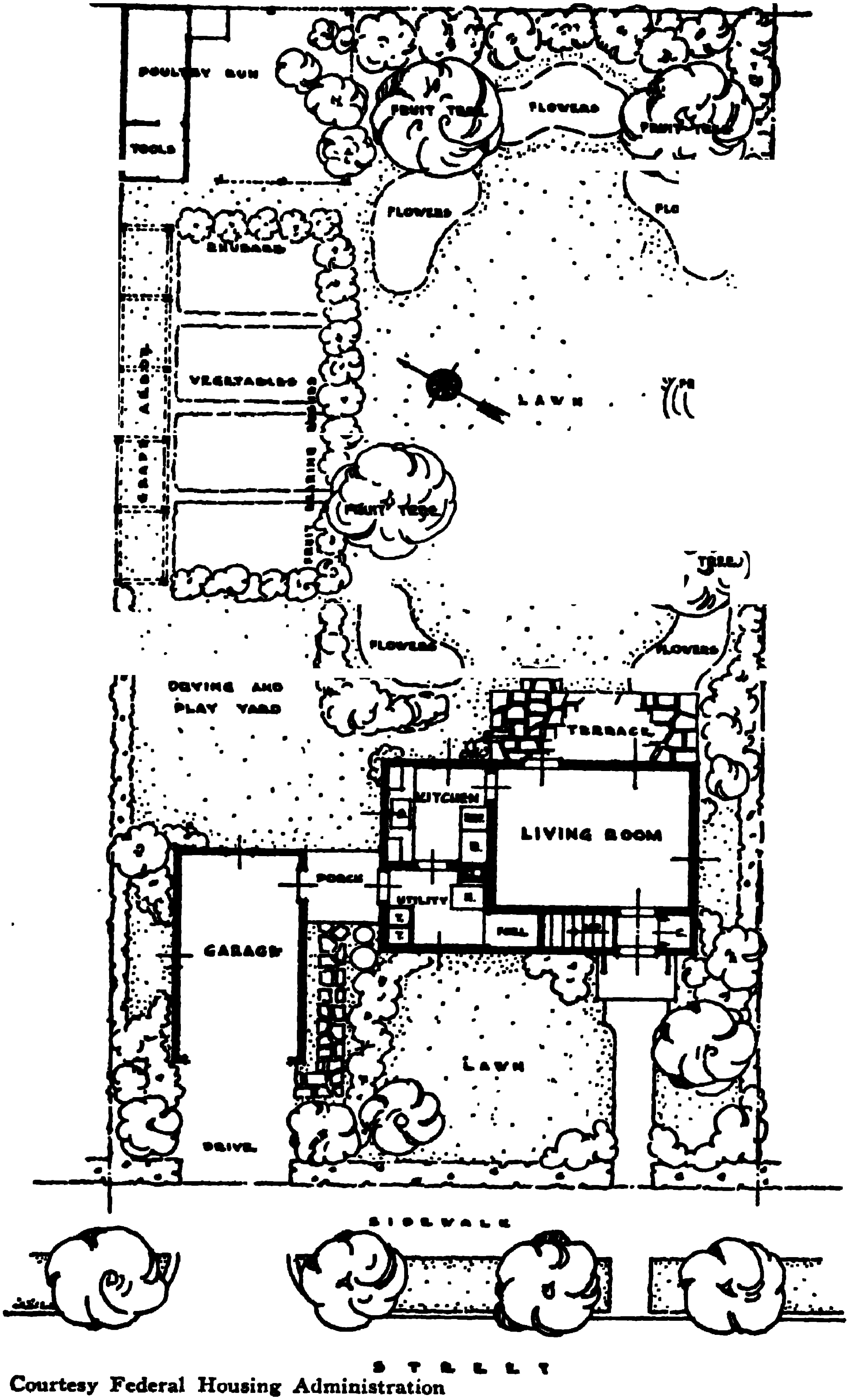
[1] Lin Yutang, *The Importance of Living*, p. 267. The John Day Co., New York, 1937.

Walls and the privacy conferred by their hedging protection have played their role for centuries in prescribing the limits of the immediate environment of a home. In England and on the Continent, as well as in China, walls and gates have been part and parcel of home planning. Wee cottages and large estates alike have their walled dominion for the use of their respective households.

Whether a shift in political thinking, a difference in population pressure, or some other reason is responsible, the limiting wall never had common acceptance in this country. The village green and the public park may have accustomed our people to sharing.

The first homes were built in close relationship for safety's sake. Later when peace was assured, and while land was still plentiful, the house sat in the midst of a spacious lawn, its wide front porch bidding welcome to all who passed, to come up and share its cool comfort. The whole plan, if such there was, was accommodated to watching that part of the world pass which chose to go by in its slow moving vehicles. Stately trees surrounded the house and an occasional flower bed dotted the lawn. Often what nature had to offer in the way of trees and flowers was used with only a casual effort at design.

Today the scene has changed. The stress of this fast moving, noisy, mechanical age, with the constant jostling of human beings against each other has forced home lovers to seek refuge from it by retiring to the rear of the house, as far away as possible from the din of the outside world and its prying eyes; we tend to become wall conscious. High land values have forced even the more expensive houses into a comparatively limited amount of space, so that if they are to appear in uncrowded repose, and their lawns to afford space for out-



Courtesy Federal Housing Administration

Plantings should be arranged to make the lot livable.

door living, the layout of the lot and the planting must be carefully planned.

It is the desire of most home seekers to develop surroundings with as much beauty as possible. If natural beauty makes a fit setting so that little else needs to be done, the homeowner is indeed fortunate. In most cases there must be planning; although planning may not provide for the pavilion, bamboos, roads, hills, springs, and all that was stipulated as essential to the pleasing environment of the Chinese home, it will have for its goal the creation of beauty in the home environment according to an accepted American pattern. This pattern may or may not call for a fence; it surely will call for a greensward which may be a "handkerchief" size about a small cottage or of parklike stretches encompassing a mansion. In each and every case the design of the grounds reflects the creative interests of the planner.

The design and planting of home grounds takes into consideration the arrangement of buildings, drives, walks, gardens, lawns, and planting in the landscape. The object is to secure beauty, privacy, shade, and freedom from the dust of the street or road as well as make the best use of the space provided to enable the required activities. It is presupposed that the lot is of such size and proportion that it will permit desirable use of the ground and will provide for good house placement and orientation. Lots that are exceedingly narrow or that have sharp angles not perpendicular to the street are difficult to arrange. It should be remembered that a one-story house needs more ground area than a two-story house with the same number of rooms.

As the inside of the house is divided into areas devoted to certain classes of activities, so divisions of the grounds outside have varied uses also. The activity areas of the house which are used in connection with outside areas should be related by direct connection or by a view into it. Due recognition should be given to the relative needs of the approach to the house, of areas for pleasure and play, of the value and advantages of outdoor living, and of service areas. The parts of the house and the lot which are related include:

The House	The Lot
Main entrance	The street, approaches, and lawn
Living and dining rooms, porch or terrace	Flower garden, provisions for adult and children's recreation
Kitchen, laundry or utility room, basement, and storage spaces.	Laundry drying yard, vegetable garden, play yard for young children, driveway for deliveries, trash and garbage storage and removal.

The garage may be a part of the house or detached. Its location in relation to the house should be determined by the part of the house from which family members expect to leave and return. That is, doctors may prefer easy access from their bedrooms, business men and housewives may prefer easy access from the dining area or kitchen. If the car is used only for social purposes, access from the living area may be all that is desired. A maximum of unbroken space on a small lot is made available for desired outdoor activities when the garage is located as a part of or near to the house.

The approach to the house from the street should be made as directly as possible. It should be in scale with the size and character of the house. On a small lot the house will usually sit fairly close to the street, the intervening lawn being in turf to form the foreground of the picture. Generally speaking, the house is best located not in the middle, but to one side of the lot, with the walk or drive from the street or road also to one side, to leave open space for lawn. Placement, however, is often regulated by city zoning ordinances or by the requirements of the lending agency whose services are used. A minimum distance is usually stated so as to prevent crowding to the front and encroachment upon adjoining property rights. Corner lots must be larger than an interior lot if an equivalent private area is to be obtained. When planning a walk from the house to the street, a straight walk is advisable when the house is closer to the street than the width of its front, although in larger properties curves in walks or roads which have an obvious reason for being, give a charming appearance of naturalness. Slight emphasis through planting may be given the entrance to the house and the entrance to the grounds.

The pleasure area should provide for beauty and for the social and recreational needs of the family, including some outdoor living space and play space for children. To make the lawn and garden a real part of the house, direct access between them is necessary, and in the best landscape development the living room overlooks the side or rear lawn. People will go into their own private outdoors often, if it is easy for them to get there. Planting in the back yard should be of a character to give a pleasant background, a screen from the public, and at the same time leave space for such garden furniture as will contribute to the social life of the family.

Generally, a special space ample in size and with sunshine and shade should be planned for the play space for the children. If it can be within sight of the work area of the house, convenience is added to pleasure. As the children grow older, and if space permits, sand piles and swings may be replaced with tennis or croquet courts which even the older members of the family will enjoy.

The service area should be of a minimum size necessary to provide for the service of supplies, the service of wastes, and the service of maintenance. It should have direct connection with the indoor service area, be readily accessible from the street, and be screened off from the outdoor living area. The service of supplies would require a driveway or walk to the kitchen and other service rooms to which deliveries are made. This may even include the coal bin, in those regions which require coal for heating. Where a garage is included it should be possible to use the driveway to it for this purpose. There is an increasing tendency to place the garage near the front of the lot or attached to the house which allows a maximum of open area to be developed in the rear. The service of wastes is satisfied by proper receptacles for garbage, tin cans, and paper. If inside incinerators are possible, these receptacles are unnecessary, but if they must be supplied outside, they should be carefully screened, accessible from the indoors, and yet removed from valuable plantings and from all possibility of causing unpleasant odors. The service of maintenance has its tools: the drying yard, the vegetable plot, and the storage for garden and yard implements. If possible they should be withdrawn and screened from the living area.

In pointing to the implications in this discussion, we may well quote the following advice from the Federal Housing Administration:

> While careful thought should be given at the outset to all aspects of the relationship between the house and its land, the entire plot development need not be undertaken at the outset. A garage, a terrace, or a porch may be added later, as the circumstances of the owner permit; while the planting, starting with that which may be considered a part of the architectural design and the part of the garden which may be useful in supplementing the owner's income, may be added to year by year. Through these means value may be gradually augmented, and, especially in the case of well-selected planting, in a measure surpassing the actual expenditure, while the house becomes increasingly a home as the owner grows in his satisfaction with his property.[1]

Trees, exceptional views, exposure to sunlight and the prevailing summer breeze should all have their influence upon plans made to get the most pleasing effect on a given lot. It is true, however, that proper use of plantings can improve and make more usable the land around any house.

To achieve the desired object too much emphasis cannot be placed upon the usefulness of planting as an adjunct to the design of any house, and especially to the design of a small house. Architectural character may be enhanced by trees and shrubs which are frequently more effective than other material as a decorative device in providing the charm essential to a satisfactory home. Hedges that can be controlled as to height and narrowness are frequently desirable along lot lines, especially between closely connected outdoor living spaces, to throw up a screen to secure privacy. Generally, broad, open lawns, curving lines and grouped trees and shrubs give an attractive appearance to a lot. Shade trees should be so placed that they will both provide shade from the hot afternoon sun and frame the house, leaving open the space at the middle in the front of the house. Plantings of all kinds act as a screen against dust and noise.

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[1] *Principles of Planning Small Houses*, p. 36. Federal Housing Administration, Technical Bulletin No. 4, 1936.

The plan of the home grounds should relate the design and planting to the size and shape of the lot, to its topography, and to the desirable orientation of the whole to wind and sun. In small grounds planning for space is a chief consideration. It should be remembered that a small place cannot be a large estate in miniature.[1] Lawns should occupy as large areas, unbroken by other features, as the limits of the place will permit. Straight lines emphasize long dimensions, so the line of the rear lawn should be parallel to the property line, and the major part of the rear yard should be kept open. Unsymmetrical arrangements in small grounds are preferable to the symmetrical. Best results are obtained by having some features or areas wholly or partially hidden, although long stretches in general view are desirable. Too great variety of plants for the small grounds is in opposition to good taste, and in any case one type of plant or foliage should predominate. Roads and walks should be few and inconspicuous, leaving lawn areas as unbroken as possible. On more spacious grounds, of course, such as those for large private houses or for public parks or public buildings, a more formal style may be adopted. Because of the present tendency to run streets at unusual angles the shape of a lot by its irregularity may add interest to its general plan. If it is possible to choose a lot with gently undulating natural slope, a more pleasing lawn, except in formal grounds, can be obtained than when using perfectly flat surfaces. A landscape plan which allows bedrooms and the kitchen to receive the benefits of prevailing summer winds and which is protected from sun is desirable.

Planting on a lot should take into account the ultimate ap-

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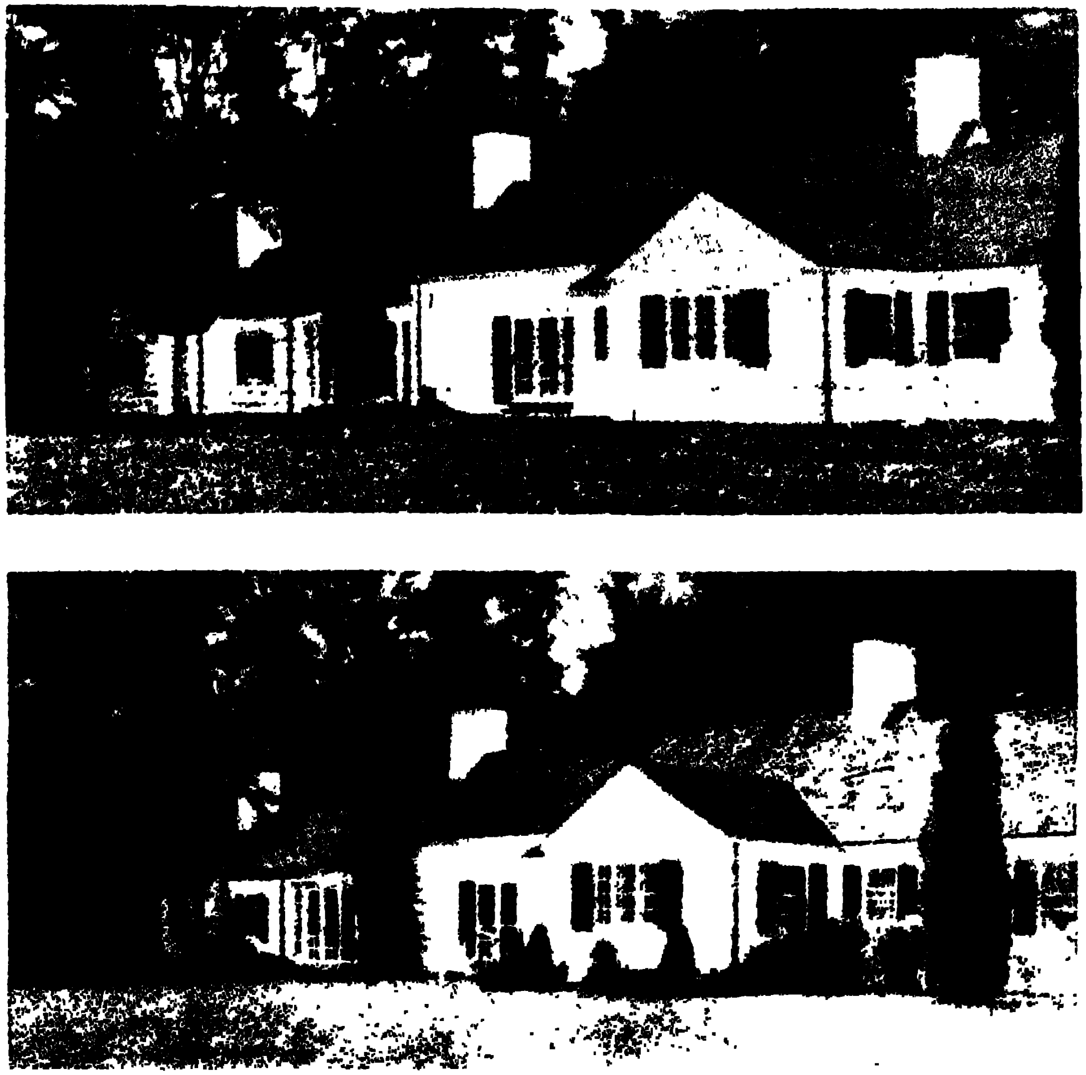
[1] M. E. Bottomley, *The Design of Small Properties*, p. 3. The Macmillan Co., New York, 1929.



Courtesy Whitbeck and Johnson

"Before" and "after" pictures showing the softening effect of well-chosen landscaping.

pearance anticipated when everything planted has reached full growth. The planting should be planned so that it is at all times in harmony and proportion with the house and adjacent area. Planting placed close to a building serves to tie it to the ground, to give it a base from which it rises, and to harmonize the lines and surfaces of the house and the line of the earth. In selecting the planting close to the house, slow growing, compact varieties should be chosen to prevent the development of a miniature forest which would obscure a small house. "A ruffle of planting completely surrounding the dwelling is most unpleasant, causing, as it does, the building to appear to be sitting on a green pillow and not coming down to earth at any point. Enough of the foundation should be exposed to assure one that the house is placed solidly on firm ground."[1] It is usually desirable to place the higher specimens at the front corners of the house, facing them down with appropriate shrubs or low evergreens. Other points of emphasis include a porch, the entrance, or a small wall unbroken by windows or other openings. Variety can be obtained by using plants of different forms of growth and various sizes and colors of leaves,—spreading, drooping, large and small leaves, leaves of various shapes and colors. By all means, whatever the planting scheme, the house and its setting should be in harmony, and should express the native regional character. A rock garden in the midst of a loam prairie seems incongruous.

Suggested Activities

1. Study a successful lot layout and landscaping of a home in your community. Why do you rate it as successful? What provision is made for pleasure areas in the yard? What provision is made for the service area? If there are children, what provision has been made for them?
2. Suggest plantings suitable for a simple cottage home.
3. List native shrubs in your locality that might be employed in pleasing house and garden plantings.

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[1] *Principles of Planning Small Houses,* p. 35. Federal Housing Administration, Technical Bulletin No. 4, 1936.

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Problem 5. WHAT ARE THE CHARACTERISTICS OF A GOOD RURAL HOME?

More than one-half of the land area in the United States is in farms, about one-fifth is in forests, and the rest is in parks, wild life refuges, and roads, except about one per cent which is covered by cities. From the standpoint of area covered as well as the contribution of its products the development and proper management of farms is as important as for cities. Farm land policies have been evolving for some time. Recommendations have been that greater recognition should be given to the farmhouse as a factor in the productivity of the farm and in the morale of farm families, and that the farm population be educated in the desirability of improved housing conditions and be instructed how best to obtain good housing. There has been some suggestion that farm land which does not produce sufficient income to support adequate family housing should be retired from use.

The objectives sought by families when choosing a site for the farmstead and planning for its development as a place to live have one point in common with choosing a site for the city home: in both cases the aim is to create pleasant and convenient living conditions for the family based on its needs and activities and scaled to its ability to support. In some other ways, however, the approach to the problem of housing the farm family is different from the problem of the city family. There is an intimate relationship between the farmhouse and farm economy that places the housing dependent upon agricultural income in a different category from urban housing.

The business of the farm family is of necessity connected with the home, and the part of the farmstead which is devoted to the business must be planned along with the house, and

This is the farmstead of an early Kansas farmer.

each must be co-ordinate with the other to produce a setting which is convenient, beautiful, and in keeping with the business. It is true that in the choice of the farm first consideration is given to the suitability of the land for the type of farming in which the farmer wishes to engage. It may or may not have a knoll or elevation uniquely suited to the location of the farmstead. If the soil and acreage are approved, the land may be purchased, and the farmstead built upon it. It may be pleasing or dismal. For the sake of all concerned, however, it is desirable that the farmstead be as pleasing as possible. It has been found that the holding power of the country for farm boys and girls is increased through expression of artistic values in the farmhouse and its surroundings.

As nearly as possible, the farmstead site should be so located that it will use natural advantages and will have suitability and usefulness as a center for operating the farm. It should allow the house to be set to secure the best views on the farm, and although the barn and yards are of necessity prominent, still the house should be so designed and located as to attract visitors toward it and afford the family a pleasant outlook on the world. It should receive refreshing prevailing winds, but at the same time natural and artificial windbreaks

Courtesy, Extension Service, U. S. D. A.

A comfortable country home set well back on the lawn, and framed with trees.

should be utilized to protect against objectionable winds and snowdrifts. Within the farmstead, the distance and direction of the house from the other buildings will be decided upon with consideration for fire safety for each and the possibility of barn-lot odors wafting away from the house. Freedom from unnecessary dust from the highway is also important. If there is a prevailing south wind a north position for the farmstead will receive more dust than one situated on the south side. In this regard it is well to remember that there is little advantage to having an isolated farmhouse and possibly the other buildings on the farmstead set square with the points of the compass. In fact, there may be much gained by placing the house at the angle most favorable for sun and breeze. Such an arrangement may be made to appear pleasing and natural if trees, drives, and other features contribute to this end. And, of course, present methods of marketing make a location convenient to a good road, if not a hard surface road, increasingly desirable. The site should be on ground that is level enough for ample work areas and easy grade connections between buildings, and that at the same time slopes away from the house and the well.

The farmhouse should be pleasing in design and should harmonize with its surroundings. The necessity for economy of space is not as great in the country as it is in the city, and the broad stretches of open landscape should be reflected in freedom of design and planting. Breadth, informality, and simplicity are the characteristics of country scenery, and these qualities should be reflected in the setting for the rural home.

The house itself is charming if one of the less formal styles is chosen. Some of the modern adaptations of Colonial, the informal Spanish, or English Cottage types are suited to rural environment, certainly better than the stiff, formal Georgian style. The farmhouse should be planned with its own setting in mind and should not be a copied city house. As features fitting in well with a rural setting, Wichers recommends irregular shapes, if they grow out of a functional plan, with first floors sitting close or no higher than 18 inches from grade lines to give a sense of solidarity, and advises large well-proportioned chimneys.[1] In appearance, the width of the house should be greater than its height, the windows should be properly spaced and proportioned in size, and doorways and porches should bear proper relation in their design, proportion, and type to the rest of the house.

The desirable set-back of country houses from the highway varies with the conditions. The house should be located not closer than 50 feet to the public road if due consideration is given to privacy and to the avoidance of dust and noise. Where the roads are not surfaced, the house should be located beyond the dust line, which is usually 100 to 150 feet.[2] If a large yard is featured in the plan, it should be well sodded, with opening and planting so arranged that it is possible to use a field mower. Otherwise, it might suffer from neglect and so be worse than none.

Trees are needed as a frame around a rural home, or as a background for the house and other buildings. Indeed, nature can correct even the worst mistakes in domestic architec-

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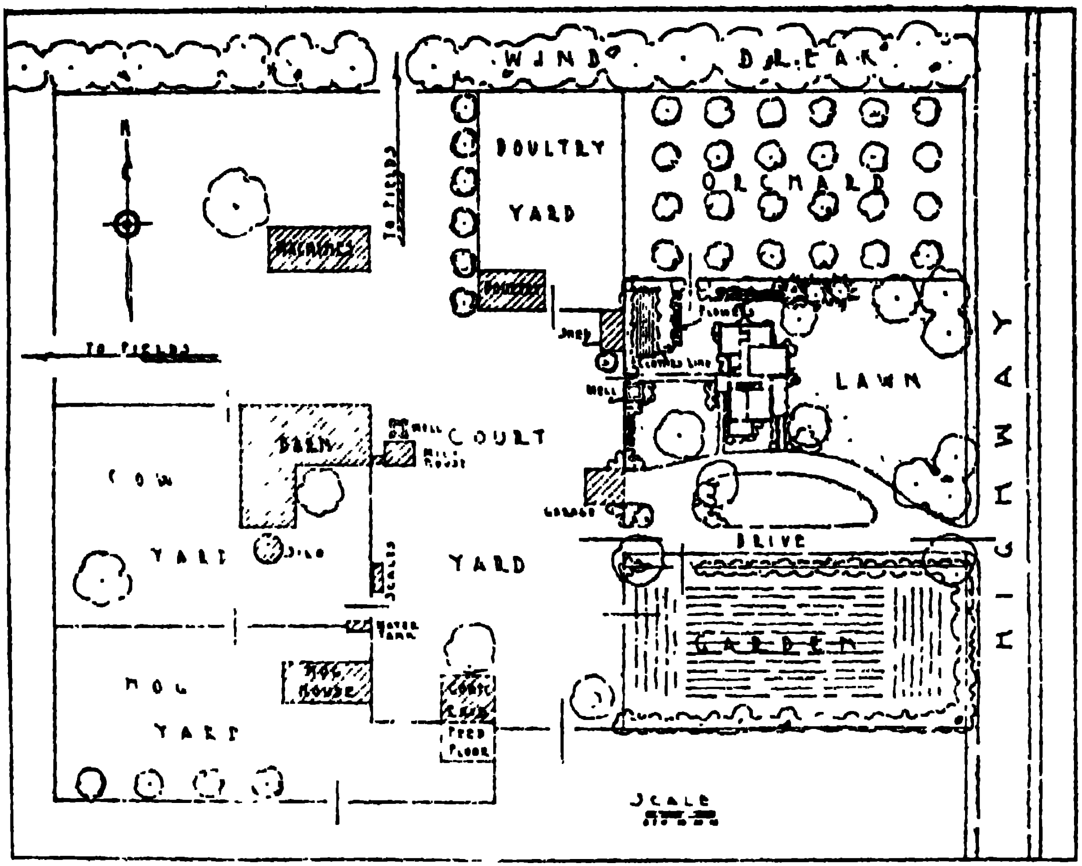
[1] H. E. Wichers, *Designs for Kansas Farm Homes*, p. 20. Kansas State College, Engineering Experiment Station, Bulletin No. 23, 1931.

[2] M. E. Bottomley, *The Design of Small Properties*, p. 104. The Macmillan Co., New York, 1929.



Courtesy Kansas State College, H. E. Wichers, Architect

Plot of a farmstead west of the highway, showing arrangement of house, barns, service yards, windbreaks, and driveways.

ture if trees, shrubs, and vines are given a chance. If they are grouped in masses, breadth and large scale are expressed, but they should not obscure the house. Aside from the beauty they furnish, trees about the rural house serve to shade the house, the work yards, stock yards, and paddocks, and they may furnish fruit. In the area of trees and grass, some farm families have developed their own picnic grounds.

The service areas around the farmhouse are usually more important and more extensive than those around the city house. Driveways must serve the barnyards as well as the house. Suggestions are often made for two drives or one that branches, a straight one to the barnyard and a curved one to the house. These should be usable in all weather. The garage should be readily accessible both from the farm buildings and the house. Provision for a parking area for the family car and for guests should be made. This area should be so located to encourage use of the main entrance to the house. The vegetable garden ranks high in importance, for it furnishes a large amount of the food for the farm family. It is visited frequently and should be accessible to the house, although not necessarily visible from it. Ready accessibility to the drying yard is necessary because laundry is done in practically all rural homes. Means of garbage disposal and a suitable outdoor sanitary toilet must be provided in places where a septic tank system of sewage disposal is not available.

Within the farm home the arrangement of rooms should facilitate comfort and pleasant living in accordance with farm conditions. Here again, as when considering the exterior, a plan borrowed from city friends will seldom produce satisfaction. The rural house is more likely to be the home of the family for the whole span of its active life than is the city house. Entertaining in the rural home is likely to be more of a family enterprise than is the case in the city home. Extra sleeping rooms are necessary because of the greater frequency of overnight guests and the occasional necessity of housing farm help. The comings and goings of the farm family are of a different nature than of the city family. In the city home the location of the stairway or the hall is usually located toward the front of the house; in the farmhouse the central rear hall is most usable. Household production is carried on to a greater extent in the farm home than it is in the city home, and the business of farming and its work are more closely related to the home than is usual for business in the city.

The work or service area with the kitchen as its center ranks high in importance in the rural home. In regard to the work to be done to maintain the farm home the report of a recent survey[1] has this to say:

> Most farm women do all their own work. Not only is there more work to do in farm homes than in comparable urban homes, but there are fewer modern conveniences with which to do it. House cleaning on the farm usually includes paperhanging,

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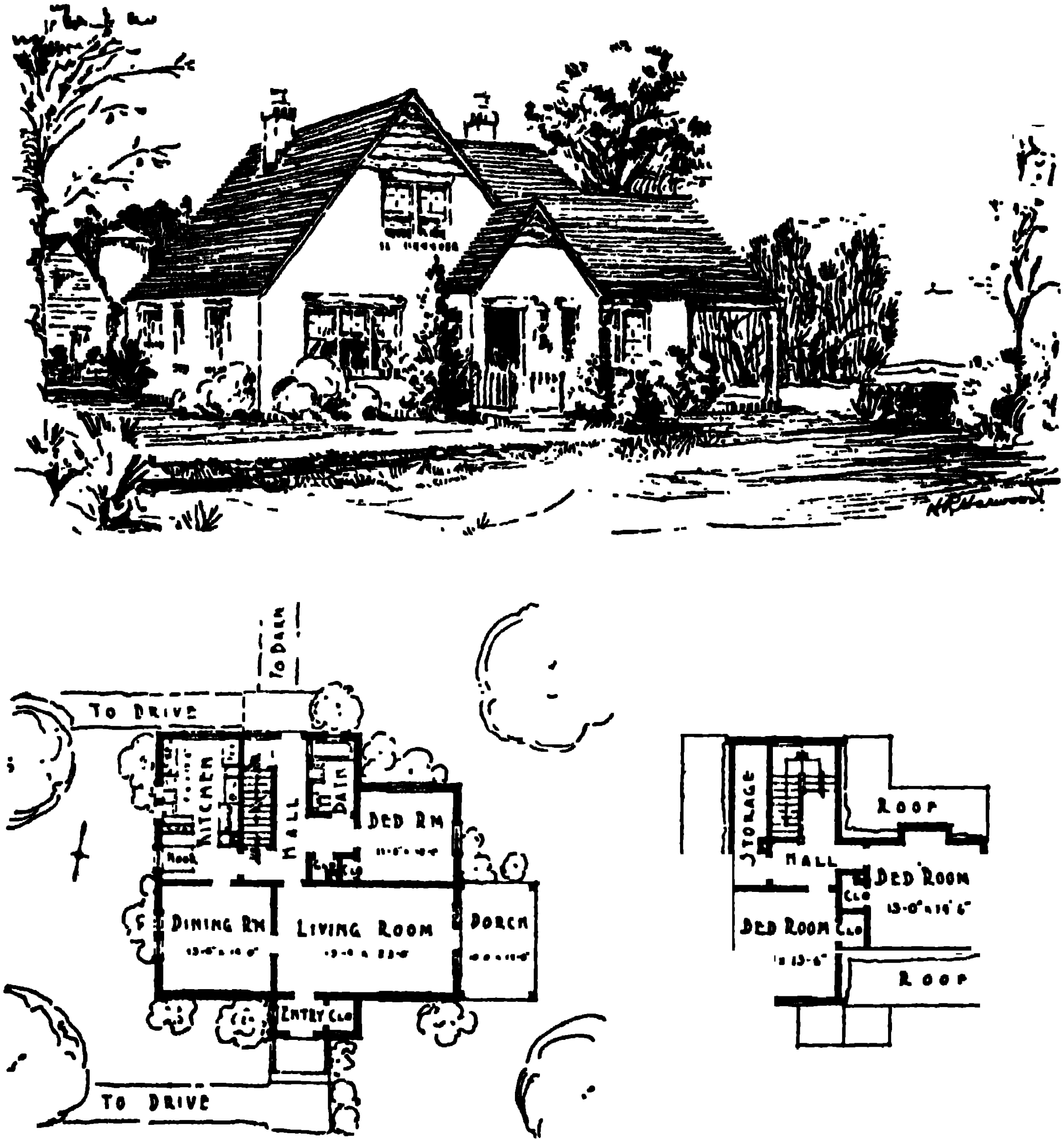
[1] Nellie L. Perkins, Wilma Beyer, and Lita Bane, *A Survey of Some Fatigue Problems of Rural Homemakers.* University of Illinois Agricultural Experiment Station, Bulletin 514, p. 13, 1945.

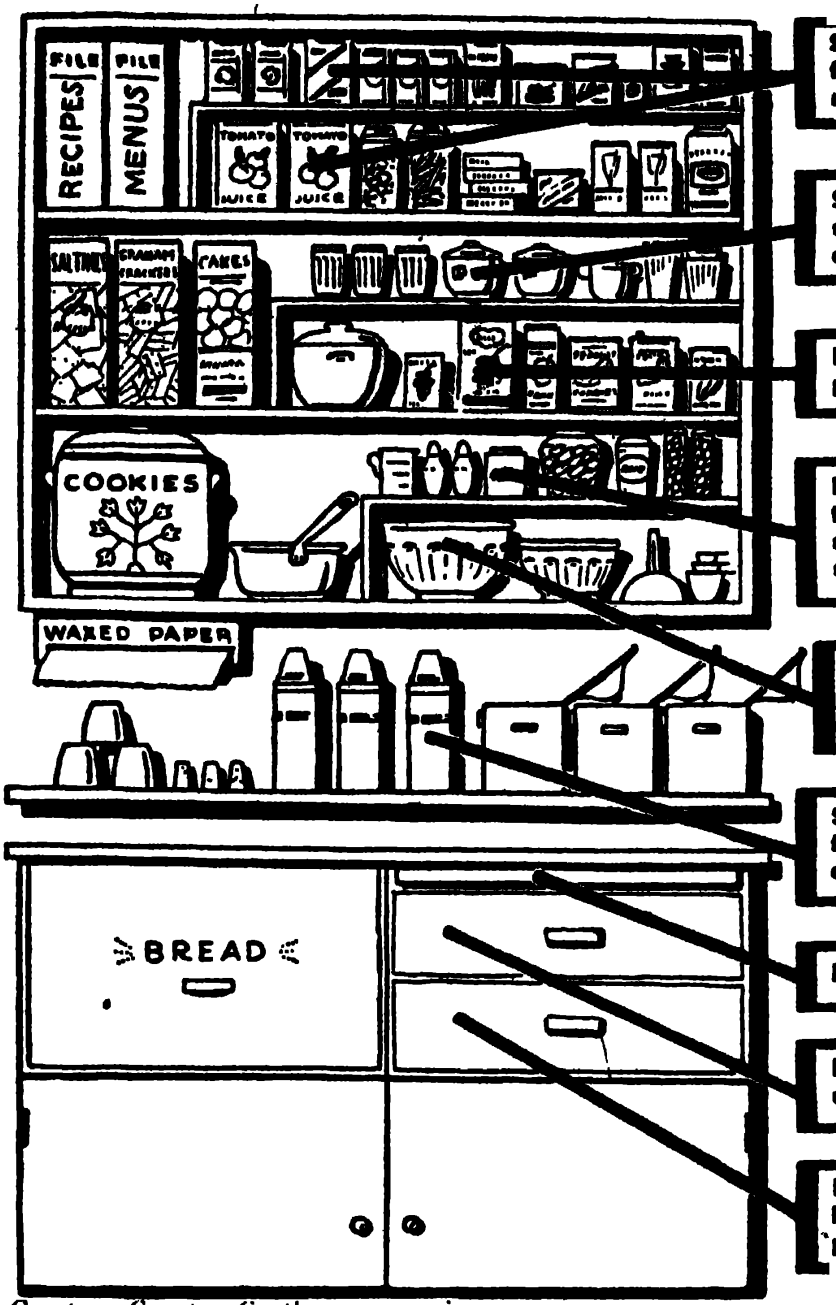


Courtesy Kansas State College, H. E. Wichers, Architect

Building a farmhouse around a hall as a core adds to its convenience.

painting, reconditioning floors and woodwork, shampooing rugs, and cleaning upholstered furniture and bedding. Farm washings are larger and dirtier than city washings. Farm cooking . . . is harder work than city cooking and there is more of it.

The ease with which the farm homemaker can do all the necessary work of her home is dependent upon the presence of certain conveniences often absent in the rural home but which are usually taken for granted in the urban home. The farm home must be self-sufficient in regard to certain utilities



Supply of canned foods—soups juices, meats, and the like.

Small jars for desserts, salads, baked beans and other hot dishes.

Raisins, nuts, candies, packaged beverages.

Relishes, pickles, mustard, peanut butter, salt, pepper, sugar, spices, mayonnaise.

Heating pan, mixing bowls, funnel and measuring cups.

Shelf open at sides, for airing lunch boxes and vacuum bottles.

Pull-out bread board.

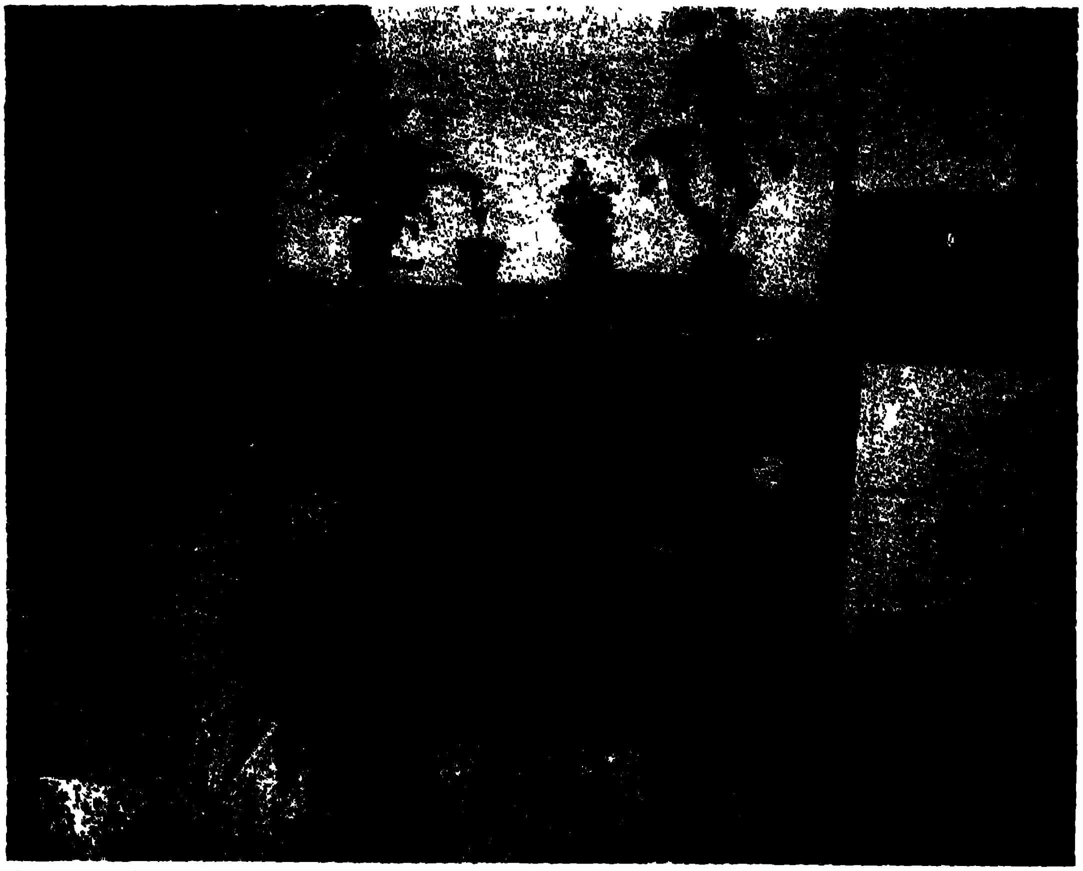
Drawer for knife, spatula and other utensils.

Drawer for paper napkins and bags, cut wax paper and string.

Courtesy *Country Gentleman* magazine

This cupboard is set-up for convenience in making lunches. If this arrangement includes nearness to the refrigerator lunches will be easy and fun to prepare.

needed in its operation. It may have connection with a public power line for electricity, but its water and sewage system, its fuel, its delivery of goods and other items are, if present, usually provided by the farm itself. Adequate water from a pure source is a first requisite. Lack of running water and lack of a way to dispose of waste water, lack of electricity for light op-



Courtesy Extension Service, U. S. D. A.

A rest center and a planning center may be located in a corner of the kitchen in a modern rural home.

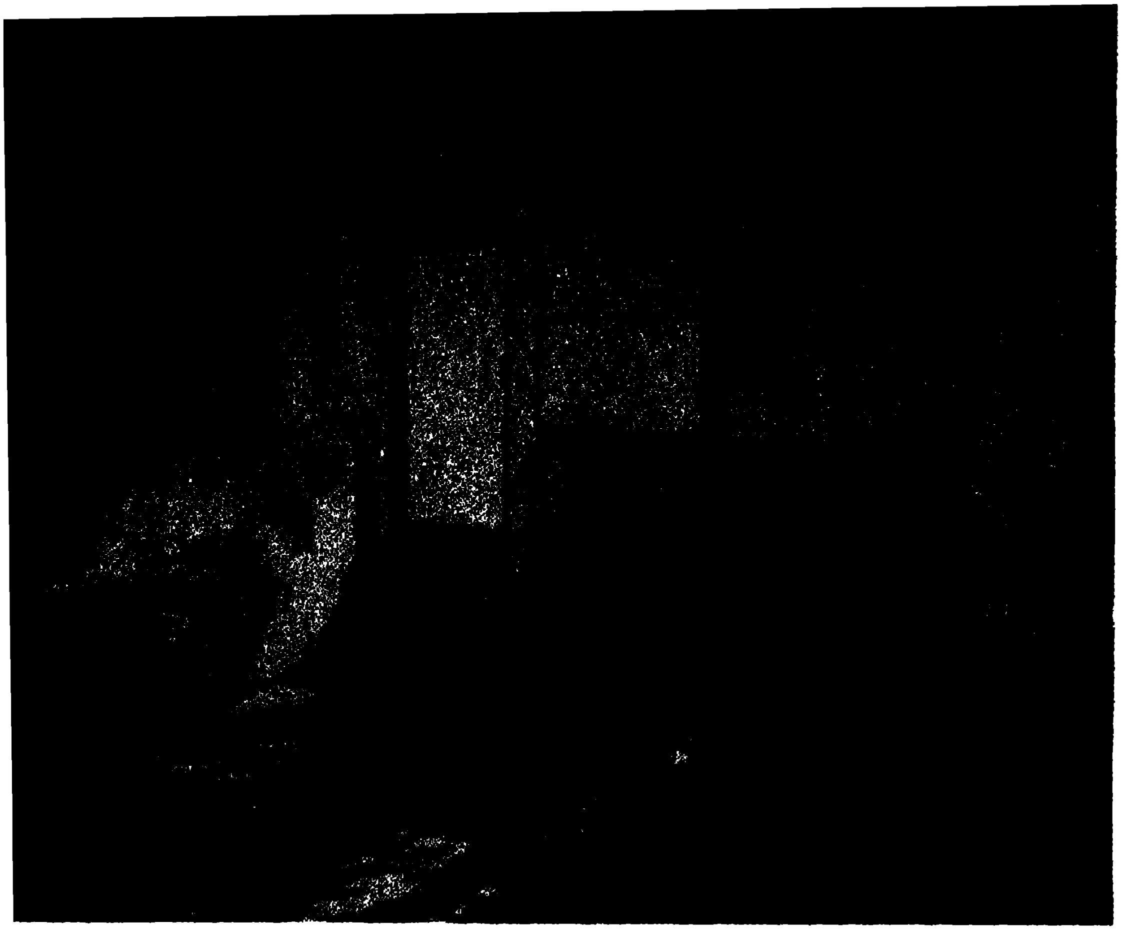
eration of labor-saving devices, and lack of a suitable central heating system capable of utilizing locally available fuels increase greatly the labor necessary to maintain the farm home and decrease proportionately the comfort of living in it. The repair of the house and the provision of adequate screens are also important provisions for satisfying living.

Space is required for preparing food for family members with hearty country appetites as well as for the seasonal help. There must be space for food preservation and also for such other activities as dairy, poultry, truck-gardening, and preparation for market of products. If the kitchen is to serve for more than food preparation and related work, space must be available for these other activities, and the food preparation area should be compactly and conveniently arranged. In many city homes shopping for food may be done from meal to meal and storage is then only a slight problem; in most farm homes, housekeeping and food supplies must be purchased in larger amounts or collected from their place of production and stored somewhere in the house.

Along with the need for more space for food preparation and storage is the need for dining space. The farmer comes to his meals from dusty or muddy fields and returns to them. A place for informal meals which are nevertheless served with good standards is important. Some farm families have enjoyed a dining nook in addition to a separate dining room or a combination living and dining room for simple family meals. For greatest convenience such a nook should be near the kitchen and the outside rear entrance. Although dining in the kitchen can be accomplished with desirable standards, it is easier and more comfortable to have the family meals withdrawn from the preparation center.

As the farm homemaker spends a large portion of her time in the kitchen and its adjoining rooms, this area should be as pleasant as possible. A pleasant view from a kitchen window is important. Because the housewife is often charged with overseeing the operations of the farmstead during the absence of the farmer in the fields or elsewhere, the kitchen should be located with one view toward the farm buildings and the highway. A rest center in the kitchen may also be a desirable feature.

Other activities which are not as common or extensive in the city home are frequent in the farm home. These include laundering, care of milk, storage of poultry products, food preservation and storage of the products, storage of chore and work clothes, washing up after farm labors, and others. In some cases, all of these may be done in the farm kitchen because of lack of other space or because the water supply is there and there are provisions for heating it. If possible, however, other provisions are usually desired for these. A general utility room where some or all of these operations could be done is often advised. If the water supply is at a distance from the house, even a separate building near the well for all of these activities is suggested, but, generally speaking, the closer



The porch is sometimes used as a workroom.

these and similar activities can be kept to the kitchen the better. The utility room should be accessible to the outside areas and to certain parts of the house. When the utility room is a part of the house, it should be so placed as to be the most convenient point of entrance on coming from the barn to the house. The basement is a possible location for the utility room, but it is not usually convenient, and hence there is created the tendency to use the kitchen. If farm hands live in the farmhouse, the utility room may be made large enough to be used as a sitting room for the help, with a closet for hanging clothes, and the bedrooms for the help may be reached from it either directly or by means of a stairway to the second floor.

It is desirable in any farmhouse to have a washroom and a closet for work clothes accessible from the rear door on that side of the house facing the other farm buildings. If it opens into a central rear hall it should afford direct access to the dining area and probably the sleeping quarters. Workers coming in from the fields can then wash and change into clean clothes before appearing for meals. If this arrangement is not feasible

Courtesy General Electric Company

Provision for conducting the farm business encourages keeping the necessary records.

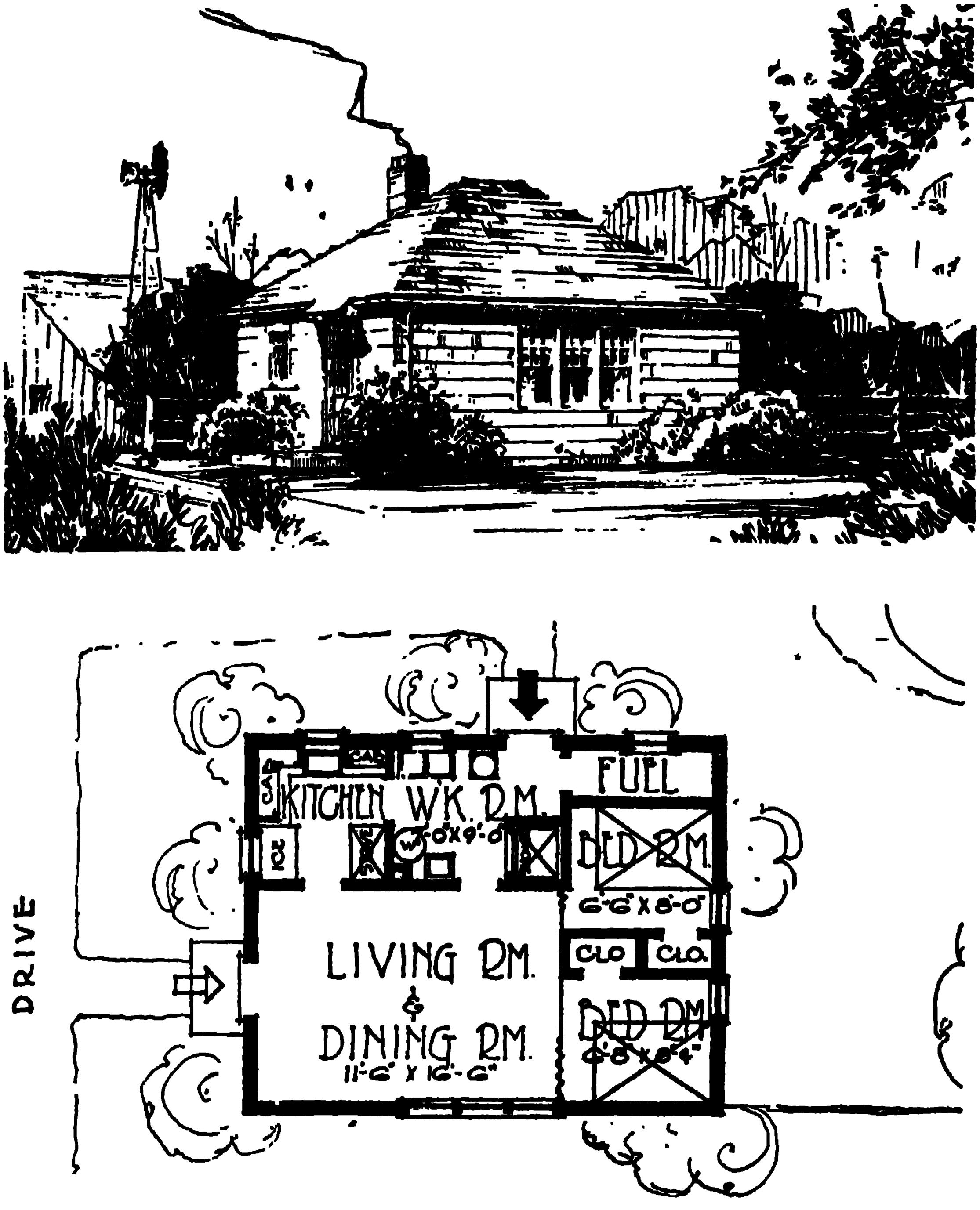
a corner of the kitchen nearest the entrance may be devoted to this service.

Because the farmhouse is the business center as well as the home, adequate provision should be made to carry on each of these parts of life. The more successful farmers keep rather detailed accounts of their expenditures and the paying status of their various farm projects. In addition the culmination of business deals on the farm must be made at a place where writing supplies are available. When the farm project justifies it, a small room in the house where the temperature can be regulated, and located so that it can be reached conveniently from the outside without interfering with the work areas or permitting soil to be carried to the social area is highly to be desired. In other cases a business center used by both husband and wife may be located in some convenient area.

Although the social area in the farmhouse is not the predominantly important space that it usually is in city homes, it is nevertheless the center for serving the social life of the family group. It should offer facilities for the various members to enjoy themselves and each other, and should be large enough to accommodate family-reunion dinners and other gatherings of large groups common to the social life of farm families. In order to obtain a space large enough for these activities, a combination living-dining room has been tried in some cases. This may be an excellent solution to the problem, especially if there is also some provision made for eating in the kitchen. Such a room should be large enough to permit a pleasing arrangement of furniture, including a table and chairs. A table two feet, six inches by five feet will seat six persons. This table might serve a triple duty—provide for company meals, for family and club conferences and games, and for the children's study. It should be possible to reach the social area easily from the outside entrance. If the living room as well as the kitchen opens onto a central rear hall which also faces the driveway, there will seldom be a time when the housewife will be more than a few steps from the main entrance to the house.

If there is a dining room it too should be accessible from the central rear hall as well as from the kitchen, so that traffic of dusty farm workers is routed away from that busy center. The dining room is usually as large as 11 feet by 13 feet and in some cases may be used as a second living room. It is desirable in any dining room that windows provide good ventilation and a pleasant view for daylight meals. A screened porch accessible to the kitchen but not truly a service porch makes a pleasant dining area for summer. If it is also large enough for a few comfortable chairs, it may be a delightful outdoor living area.

The rest area should make provision for the occasional overnight guest and the extra farm help where conditions require it. The family sleeping quarters should be located toward the prevailing breeze in warm climates, and they should be accessible from outside areas without passing through important rooms.



This is a small house without a hall. The main entrance is toward the drive.

Although recommendations following studies have been made for the amount of expenditures for housing by families with fixed incomes, but little study has been given to what amounts farm people are justified in spending. The farm family might follow the generally accepted rule that the house should not cost more than two and one-half times the average annual income, remembering that the value of the living furnished by the farm should be considered as part of the income.

Until the late 1930's but little attention was given the rural home in regard to ways of financing its ownership or improving the housing by public means.,Early in 1940 impetus was given to the rural housing movement by the announcement of the first projects to be undertaken in farm areas with USHA assistance. States represented in the first group of rural projects were Arkansas, Georgia, Illinois, Indiana, Mississippi, and South Carolina. Other states have been included since. Simple low-cost dwellings are provided for four types of low-income farm families: owner-operators, tenants, sharecroppers, and rural wage workers. In most cases cash rents of less than $50 a year on the new farm dwellings are possible because the tenants themselves perform the ordinary maintenance and repair work.

Under the Bankhead-Jones farm purchase program, the Farm Security Administration, later called the Farm Home Administration, developed new farm homes for tenant, sharecropper, and farm-labor families. Homes under this plan have been built at an average cost of $1313. This cost amortized over forty years under the terms of the Bankhead-Jones act represents new housing for these families at an average cost of $56 per year.

It is apparent that the farmhouse should be planned with regard to the life to be lived in it. Certain requirements of the farm family in its social, rest, and work activities should be reflected in the plans for it. The work center in a farmhouse is usually more important than the other areas because a large amount of household production is common. If a new farmhouse is being planned, consideration should be given to the fact that it will likely house the family through its whole cycle, and therefore it should be adequate to meet the needs at these various times.

Suggested Activities

1. Analyze the activities carried on in a farm home. With this background check several farmhouse plans to determine their adequacy as a living unit.
2. Describe a farmstead plan convenient for carrying on the farm business and family life, and satisfying in appearance.
3. How would you rate the standards of rural housing in your locality?
4. If you desired to make a study of rural housing in your county, what information would you want to secure?

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Problem 6. WHAT ARE THE CHARACTERISTICS OF A DESIRABLE CITY APARTMENT?

A casual visitor to one of the great cities of our land may regard the hurrying, eddying, buffeting stream of humanity that flows through its streets with interest tinged with a sense of apartness. Such is not the case when he is brought to view the sky line in which the citizens of the metropolis take such pride. The medley of spires and turrets; the towering masses of apartment houses and hotels; the dominating bulk of factories, warehouses and their ilk stir his imagination and give him zest in man's achievement and a sense of sharing in the social gropings of his time. If the windows shine in the reflected glory of the setting sun, or are changed into a softer splendor by the touch of moonlight, our sightseer may declare that it is a fair city, and accept as factual the seeming grace of the distant view of home, church, and market place. Mumford points out:

> Cities arise out of man's social needs and multiply both their modes and their methods of expression. In the city, remote forces and influences intermingle with the local: their conflicts are no less significant than their harmonies. . . . When a city ceases to be a symbol of art and order it acts in a negative fashion: it expresses and helps make more universal the fact of disintegration. In the close quarters of the city, perversities and evils spread more quickly, and in the stones of the city these antisocial facts become imbedded.[1]

If our sightseer were to find suddenly that he must reside in this city, his concern with the social or antisocial facts imbedded in its stones becomes far more real and pressing than that felt in his former role of observer. Even his sense of apartness from the hurrying crowds on the street is shattered. He realizes that the life of a family living in an apartment house

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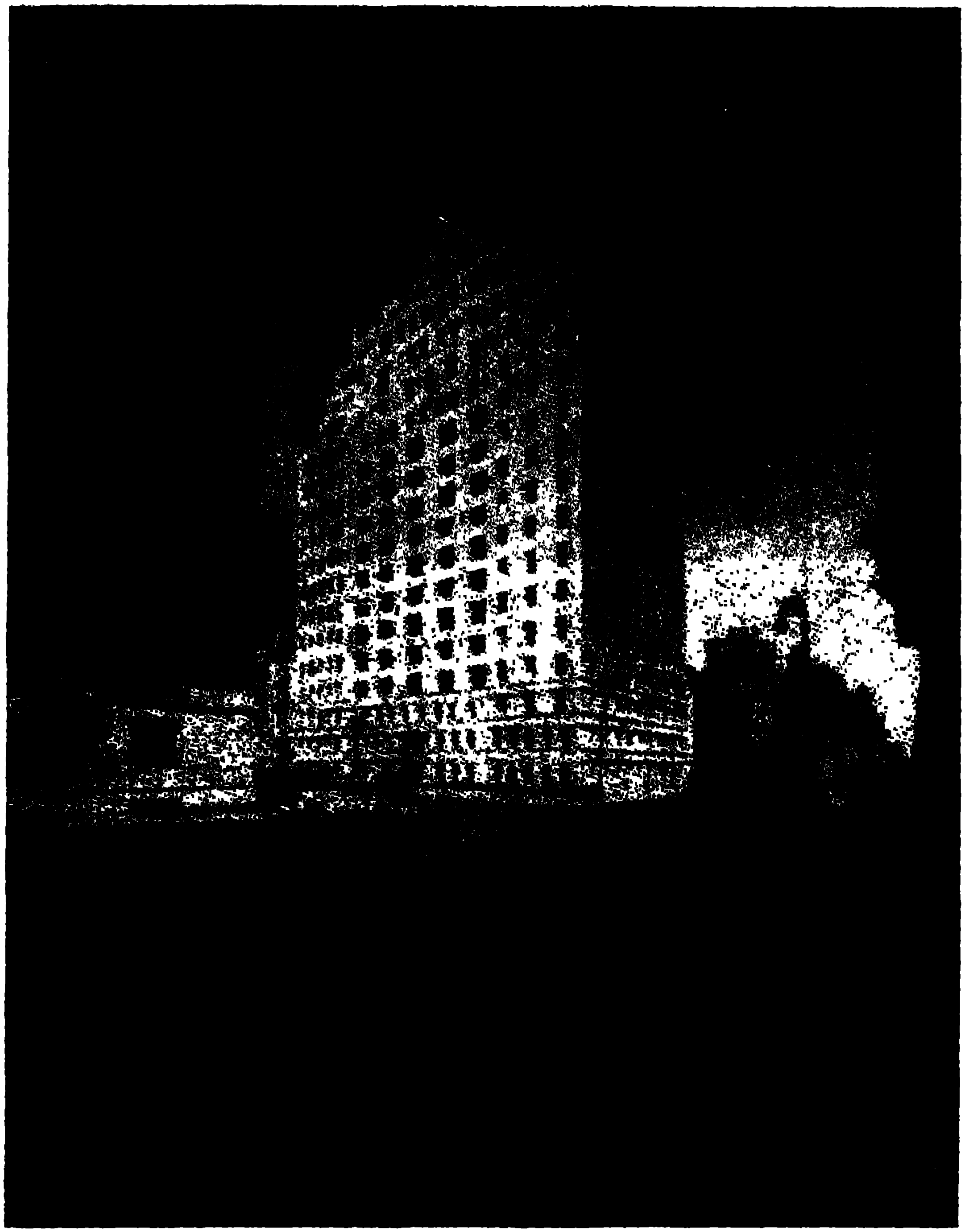
[1] Lewis Mumford, *The Culture of Cities*, pp. 4, 6. Harcourt, Brace and Co., New York, 1938.



Courtesy General Bronze Corp.

This metropolitan apartment house is somewhat withdrawn from heavy traffic yet relatively near in time and distance to wanted facilities.

is greatly affected not only by the interests, traditions, and character of the other families living there, but also by the interests, traditions, and character of the crowd that surges in the street below. "Is it in a desirable location?" is one of the first questions asked by the prospective renter concerning any apartment presented for his consideration. The connotation of the term "desirable location" is somewhat inclusive. Discussion with apartment dwellers indicates that important factors in determining the desirability of a location include the following:

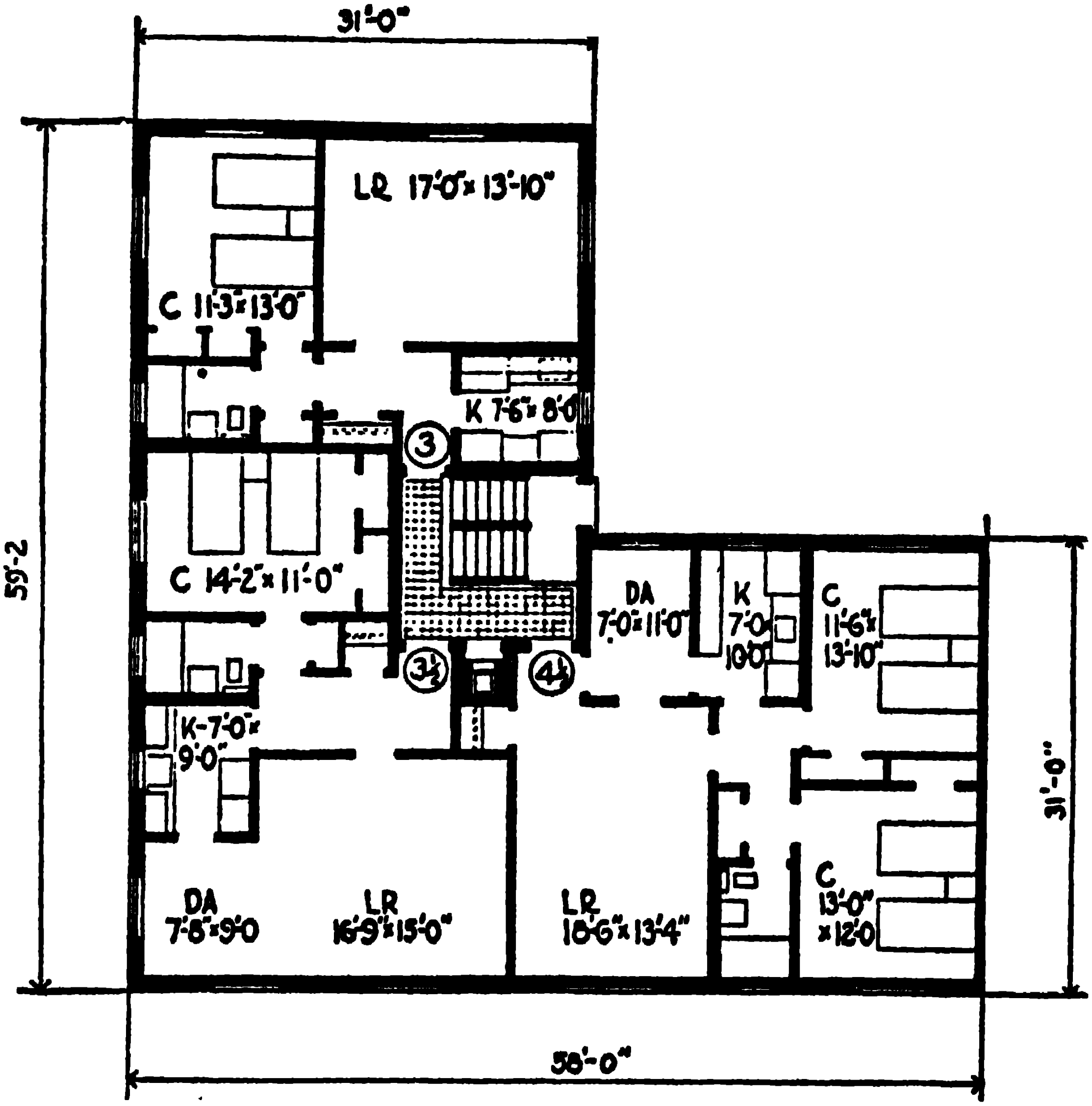
> The location should afford easy access to churches, schools, stores, and markets, or to the theaters. It should afford "reasonable transportation in a reasonable period of time" to and from the place of employment.
>
> The location should not be on a thoroughfare or on a street bearing heavy traffic, but ready access to these may be desirable.
>
> The location should be in a section primarily residential, well protected by zoning regulations and deed restrictions that will maintain its character.
>
> The location should take advantage of as many of the natural amenities as possible. These might include a view of an adjacent park or a distant mountain, lake, river, or other body of water; openness to a cooling prevailing summer breeze, but not in the path of one which picks up obnoxious odors or fumes; and openness to sunshine the year round.
>
> The location should be one that has been found satisfactory by families having a similar heritage and cultural pattern to that of the prospective renter. It seems easy for Americans to find satisfaction in Paris in living under conditions and among people whose traditions are at variance with their own. But it seems hard for Americans at home to be tolerant enough to share with equanimity the shelter of an apartment house or hotel with families whose racial or cultural pattern differs greatly from their own. Hence, concern as to the people who are already residents or anticipated as residents is commonly expressed.

The next question which concerns the apartment seeker is, "Does the apartment have the services which are needed to carry on the desired way of living?" The services available to apartment house dwellers should be sufficient to enable the homemaker to manage easily the mechanics of home life. An apartment may be rented unfurnished, partly furnished, or completely furnished. So-called unfurnished apartments may have a range and a refrigerator supplied. In addition to the apartment itself many families desire the privilege of using a storage locker, a laundry and drying space, and indoor and outdoor play space for the children. Because a fairly large proportion of the larger apartment houses are located close to the business sections of the town where space is limited, garages are provided less frequently in connection with such dwellings than in cases where the building houses fewer families. Weekly or daily cleaning service may be included in the rent, and in some apartments it is possible to secure complete maid or valet service and to have the advantage of a delicatessen shop and a dining room in the apartment building. Other services included in the rent are the supply of hot and cold water, waste disposal, sometimes heat or cooling, and if provided the services of a doorman, or porter. The telephone and electricity are usually at the expense of the tenant. It is becoming more common for heat to be supplied privately.

An important consideration in the choice of an apartment is the money available for rent payment. If the estimates made in the various slum clearance housing proposals are sound, five-story "walk-up" apartments can be constructed to rent at $7 a room per month; twelve-floor elevator apartments can be constructed to rent at $9 per room per month. This means that a four-room apartment in these projects designed for those families whose incomes are $1,200 or less, rent for $28 and $36 respectively. Rents in other apartment buildings vary depending on the location, the quality and quantity of services rendered, and the tendency of the rent levels at the time and in the locality. Normally the monthly rent may be from $15 to $20 for a small unfurnished apartment in a less desirable locality to several hundred dollars for a sumptuously furnished and serviced apartment in a fashionable neighborhood.

With the location, the services offered, and the rent required in mind, the next question is, "What arrangement within the apartment is the most serviceable?"

The arrangement of the rooms in an apartment should be such as would facilitate gracious living and make for ease in the dispatch of household tasks and other details of family

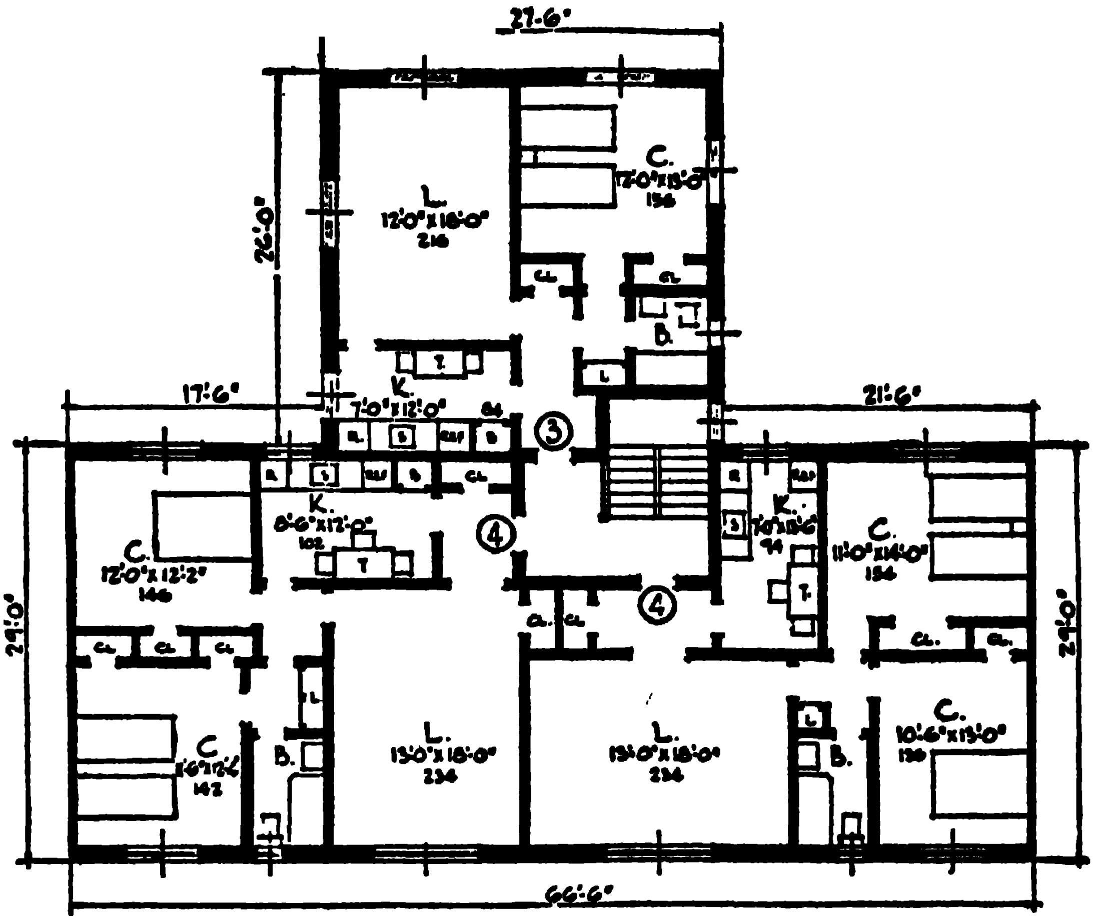


"3L"—3, 3½, 4½ rooms

Courtesy Federal Housing Administration

The building in which apartments are housed must be arranged to allow for a maximum of windows. This is an L-shaped arrangement.

living. Because space must be conserved, there is a tendency to limit hall space and to provide rooms that may be made to serve dual or triple service, as the living room which may also serve as the dining room and possibly as a bedroom. In such cases careful planning for the space needed for these should precede the construction of the building, or the possibility of desirable "traffic routes" to the door, the telephone, and the bathroom may be limited. The small one- or two-bed-



"3T" — 3, 4, 4 rooms

Courtesy Federal Housing Administration

A T-shaped arrangement of apartments. Note that the amount of space given to halls within the apartment is limited.

room apartments and the so-called one-room efficiency apartments usually have only one entrance to each apartment through a common hall. Skillful arrangements within the apartment makes this entrance accessible to the kitchen, the living room, and the bathroom in the most direct manner possible. A service entrance to each apartment in addition to the main entrance is a convenience.

Location of the most used rooms toward a pleasant view or cheerful sunshine is to be desired. A point not mentioned above, to which too little attention may be given when selecting an apartment, is the exposure of at least some of the rooms to the prevailing summer breezes. It has been found that apartments on the windward side may cool to a comfortable temperature several hours earlier in the evening than those on the lee side. This may make the difference between a night's sleep and a sleepless night in hot weather. This is more important in an apartment than in the average free-standing house, because it is not possible when living in an apartment to seek and use the cool side of the building. Conversely, in the winter it may be that the windward side may be uncomfortably cold or difficult to heat.

The size of rooms in an apartment usually differs somewhat from that commonly cited for one-family dwellings. The minimum room sizes for apartments as recommended by PWA Housing Division are shown here.[1]

	Minimum Dimension	Minimum Area Square Feet
Apartment living room	11′0″	150
Main bedroom	10′0″	110
Second bedroom	9′3″	100
Kitchen	7′4″	65
Bathroom standard dimensions	4′11″x6′8″	

These are minimum sizes, and in general rooms in an apartment are smaller than the usual rooms in a private dwelling.

It will be noted that the kitchen and the rest of the service area are small and the social area is relatively large. The service area is suppressed within the apartment because the occupants may wish to carry on only a limited amount of the service activities themselves, these services being supplied them from other sources. They may share the space allotted for these activities with the rest of the apartment community as is often done with the laundry.

Assured as to the desirability of all of these items, attention may be given to the apartment building itself: its orientation on the lot; its exposure to sunlight and the prevailing winds; the relation of the amount of ground area not built on to that covered by the building structure; and the use to which the building is put. These all relate to the plot design or property layout. One may not be able to change the plot design, but one may regard as "ineligible for wise choice" apartments in structures found unsatisfactory in these details of design or layout. As far as the building itself is concerned, it should be scrutinized for safety. The building should be as nearly fireproof as possible; it should be free from adjacent fire hazards. It should provide adequate fire escapes of ready access. Well-lighted, noncombustible stairs of easy tread should be provided where elevators are not used. If the building is to contribute to one's sense of order and beauty, its exterior design should be artistically satisfying. It should be free from decorative detail unrelated to its structural frame, from false fronts, false gables, false chimneys, and from overemphasis of the picturesque or the antique. Some apartment houses have been so cleverly designed that they really contribute to the charm of the community and the satisfaction of the tenants, but this is still far from common.

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[1] "Apartment House Planning Requirements," *The Architectural Record*, vol. 77, p. 173, March, 1935.

Suggested Activities

1. Investigate the apartments available in your community in regard to location; size, number, and arrangement of rooms provided. What percentage of the lot is usually covered by the structure? Is there any provision for gardens? Is there a variation in quality of apartments from one part of the city to other parts? What is the average rate per room per month for these apartments?
2. Write a brief report of some one of the recent low-cost housing projects.

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UNIT THREE

◆ ◆ ◆ ◆ ◆

Meeting Housing Needs on the Family Income

MOST, if not all, families and individuals are concerned about their income whether it be large or small. To obtain it usually some one of the group must spend his energies or exploit his talents, and from its use, supplemented by the productive activity of other family members, the group must secure most of the necessities of life as well as whatever of the luxuries it affords. Income is one of the most potent factors in determining the standard of living of the family or individual and it is counted as an index of social standing.

The money income may be derived from one or more of several sources, the most common being earnings from personal efforts, earnings from money invested, and annuities, endowments, pensions, or gifts. The amount and security of the money income is dependent upon the occupation, the financial ability of the family head, the age and the sex of the worker, and upon the stage of the economic cycle.

The money income is not the only economic resource which the family has. It is well known that two families having similar needs and similar amounts of money incomes seemingly derive far different benefits. On the one hand, management or the judicious direction of the use of means to accomplish the end of comfortable living may apparently expand the satisfactions possible from the income. Again, a family may do for itself a large number of things which it could buy, that is, it may perform services, or change raw products into a usable form. Economists call this household production and by its use a family may further extend the satisfactions possible from the money income.

Social income is another economic resource which if used properly contributes to the satisfactions derived from the money income. It is that income which individuals derive from the use of things for which society as a whole pays through taxation or voluntary and collective contributions. Generally, the benefits received are far in excess of those for which any one person pays. In fact, as a rule it would be impossible to supply the facilities individually. There would be far less travelling by car if each one who travels had to build his own roads, and much less going to college if each student were required to buy all the books he reads. Included under social income are educational, cultural and recreational facilities, health and sanitary services, welfare provisions, transportation and allied services, protective agencies and government subsidies that relate directly or indirectly to the life of the family. The extent to which a family's scale of living is affected by social income is dependent upon the amount and quality of facilities and services available and the use which the family makes of them. If there are no parks, no museums, no public clinics, a family must supply these benefits themselves or do without them. On the other hand, if these and other facilities are available in excellent qualities, but the family does not use them, then to that extent it is a loser.

All three types of income are important, but through the money income the family will make provision to meet its housing needs. Hence, the amount of the money income is of particular concern to the family members as it determines largely the scale on which they live. Although the standard of living for people as a whole in the United States is perhaps higher than in most other countries, the number of wealthy people is not large nor is the average income exceedingly high.[1]

It is known that in 1941, a prosperous year in which incomes were over 40 per cent greater than in the middle 1930's, over half of the non-farm families of two or more persons in American cities and small towns had incomes of less than $2,000. The income bracket of $2,000 to $5,000 had a second 40 per cent of the families. Only 5 per cent of the families had incomes of more than $5,000. Farm families typically have much lower money incomes than city families. In 1941, more than half of all farm families had cash incomes of less than $1,000, and 85 per cent had less than $2,000. Although it is true that part of the farm family's living comes from the product of the farm, it must be recognized that for the typical farm family a large cash expenditure for new housing or for remodeling is out of the question except during periods of extraordinary prosperity.

PERCENTAGE DISTRIBUTION OF NON-FARM FAMILIES OF TWO OR MORE PERSONS BY MONEY CLASS, 1941[2]

MONEY INCOME	NON-FARM TOTAL	CUMULATIVE
Under $500	8	
$500–$1,000	14	22
$1,000–$1,500	16	38
$1,500–$2,000	17	55
$2,000–$3,000	26	81
$3,000–$5,000	14	95
$5,000 and over	5	100

It is interesting to note what such incomes may mean in terms of a standard of living and in terms of obtaining shelter.

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[1] "National Income," *Monthly Labor Review*, vol. 45, p. 411, Aug., 1937.

[2] "Study of Family Spending and Saving in Wartime," U. S. Department of Labor, Bureau of Labor Statistics and U. S. Department of Agriculture, Bureau of Human Nutrition and Home Economics.

In many localities the family having an income of between $2,000 and $5,000 could be assured of the essentials of living and could exercise some choice in satisfying personal needs. It could provide for the old age of its members or for unfortunate times through modest savings. Its social opportunities are probably satisfactory. On the other hand, the family of the wage earner receiving less than $2,000 could expect that not all of its physical needs and that few, if any, of its cultural needs would be met. Its income would be insufficient for adequate health protection and for security through savings.

As to the kind of shelter which can be provided, it is noted from the table on page 217 that 22 per cent of all non-farm families in 1941 earned $1,000 or less. If a house should cost no more than twice the annual income, these families could afford a house costing not more than $2,000. Only one per cent of the houses built with mortgages insured by FHA during 1940 and 1941 were valued at less than $2,000. It is obvious that little new housing is being produced at costs which families in the lower income brackets can afford. In view of this fact, the lower income families are almost entirely dependent upon the existing housing supply and in general must live in housing which has depreciated in value sufficiently to come within their means. For many, when this occurs, the housing is likely to be substandard. Concern with the undesirable housing conditions of many families of the lower income group has led to efforts directed toward improved housing. Unfortunately the matter is not as simple as it might seem. Shelter is only one of the needs to be provided from the family income. If the income is not increased, as at the moment seems likely, then the problem becomes just that of determining what amount may wisely be spent for shelter.

Problem 1. HOW MUCH SHALL THE FAMILY SPEND FOR SHELTER?

Again and again reiteration is given to the fact that shelter is only one of the basic needs to be provided for from the family income. Consideration must be given to shelter in relation to the total needs of the family. These are commonly listed as food, clothing, shelter (including home maintenance and fuel), light and refrigeration, savings, and other living. The first four items need little explanation. Items in the group "other living" include transportation, medical care, education and reading matter, organizations and professional expense, recreation and travel, aid to dependents, and gifts, church, and charity.

When attempting to determine wise expenditures for each of these needs, many families find it advisable to make two lists: one including the things they must have, the other including additional things they desire to have. It is obvious that what may be considered a necessity on one income may properly be regarded as a luxury on a lower one. Therefore any plan for proposed expenditures must be considered from the standpoint of available income for a given family. The "must haves" may be classed under the headings of food, clothing, shelter, and home maintenance. These are necessities for families of any income. The desire-to-have items may be higher qualities or greater quantities of the items included under necessities, or they may extend into the fields of "other living" and savings. It is not difficult to see that "other living" on a lower income is meager. Not infrequently an attempt is made to expand this provision by lessening expenditures for housing and other necessities; such adjustments are most unwise if they disregard or fail to make provision for the basic requirements of the family.

The interests of the family members, as manifested in their tastes, desires, and ideas, affect the distribution of expenditures in quite as real a way as does the amount of money available or the family composition. For example, the paramount desire of the whole family group may be saving to provide college education for the son and daughter. In such case, adjustments in the distribution of expenditures that will make this end possible may be cheerfully accepted by all members of the group. The goal seems so important as to dwarf possible inconveniences in the home, and to make acceptable restrictions in clothing or other expenditures that would otherwise be galling. In such case, concern with nonmaterial values is greater than that felt for acquiring things.

In other cases, interest in a beautiful high-powered motor car, membership in a country club, or ownership of a yacht, on the part of one or all of the family members may lead to acceptance of a distribution of expenditures wholly out of line with that regarded as characteristic of balanced living. Interests as well as expenditures may need to be scrutinized and checked as to their validity.

As has been previously pointed out the amount of money necessary to supply the basic needs of the family varies with the family composition or the stage at which the family is in its cycle. Ability to provide for these needs is largely determined by the amount and regularity of the family income and the price scale of the items needed. Some families on each income level have been markedly successful in planning and using their resources. Inspection of the records of such families as shown in cost of living studies throws light on the common percentage distribution of funds for shelter and other needs. Seldom will a family find a case reported that exactly parallels its own situation, nor will a pattern determined statistically fit in its detail. Still, a study of the average spending habits of many families should prove profitable.

The report on page 221 shows the distribution of annual current expenditures by families of wage earners and clerical workers in an eastern city during the years, 1934–35. The analysis is made in terms of a consumption unit which is the relative demand of each individual in the family figured on a composite basis. The percentages of the total expenditures spent for shelter varied between 20 per cent and 21 per cent. When costs of fuel, light, refrigeration, and other household operation were added the percentages were from 31 per cent to 34 per cent of the total expenditures for living.

On the basis of facts ascertained by studies of standards of living, budgets have been constructed by various agencies to guide families in their attempts at establishing a desirable distribution of their expenditures. The budget shown in the table on page 221 is suggested by the Heller Committee for

DISTRIBUTION OF ANNUAL CURRENT EXPENDITURES BY FAMILIES AT DIFFERENT CONSUMPTION LEVELS IN ROCHESTER, 1934–35[1]

Items	All Families	Families with Annual Expenditure per Consumption Unit of		
		Under $400	$400–$600	$600 and over
Number of families studied	301	96	115	90
Average number of members in economic family	3.4	4.51	3.25	2.40
Average number of consumption units per family	3.17	4.13	3.03	2.30
Average total current expenditure	$1508	$1286	$1479	$1782
Average money income	1503	1274	1486	1772
	Percentage Distribution			
Expenditures for				
Food	29.7	34.5	30.2	25.6
Clothing	10.2	10.3	10.6	9.7
Housing	20.4	20.8	20.5	19.9
Fuel, light, refrigeration	9.2	10.8	9.5	7.7
Other household operation	3.3	2.8	3.2	3.8
Furnishings and equipment	3.8	2.7	3.4	5.0
Automobile; purchase, operation, etc.	6.2	2.3	5.4	9.9
Other transportation	1.9	1.9	2.0	1.8
Personal care	1.9	2.0	1.9	1.9
Medical care	3.6	3.0	3.7	3.8
Recreation	5.5	4.9	5.5	6.0
Education	.7	.8	.7	.8
Vocation	.4	.4	.4	.3
Community welfare	1.4	1.5	1.5	1.4
Gifts and contributions	1.5	1.1	1.1	2.2
Miscellaneous	.3	.2	.4	.2
Total	100.0	100.0	100.0	100.0

Research in Social Economics of the University of California. It aims to be of assistance to families of three difference economic levels, that of the executive, the clerk, and the wage earner. This study recommends that from 16 per cent to 18 per cent of the total budget be used for housing alone. When fuel, light, service, and furniture and furnishings are added the total for shelter amounts to from 28 per cent to 31 per cent.

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[1] "Money Disbursements of Wage Earners and Clerical Workers in Rochester, Columbus, and Seattle," *Monthly Labor Review*, vol. 43, p. 1611, Dec., 1936.

COST BUDGETS FOR TWO INCOME LEVELS[1]

Item	Salaried Worker			Wage Earners					
				Home Renter			Home Owner		
	Annual Cost	Percentage		Annual Cost	Percentage		Annual Cost	Percentage	
		All	After Taxes		All	After Taxes		All	After Taxes
Total Cost	$8,073.27	100.0	. .	$5,405.21	100.0	. . .	$5,761.77	100.0	.....
Income Taxes	1,126.11	13.9	....	554.90	10.3	....	608.69	10.6	.....
Federal	1,096.00	13.6	.. ..	547.18	10.1	.....	600.71	10.4	. ...
State	30.11	.3	....	7.72	.2	.....	7.98	.2	.....
Total, all other budget	6,947.16	86.1	100.0	4,850.31	89.7	100.0	5,153.08	89.4	100.0
Total Cost of Food	2,039.05	25.1	29.4	1,619 48	30.0	33.4	1,619.48	28.1	31.4
Food at Home	1,681.72	20.9	24.2	1,590.47	29.4	32.8	1,590.47	27.6	30.9
Food Away	357.33	4.4	5.2	29.01	.6	.6	29.01	.5	.5
Alcoholic Beverages	68.33	.9	1.0	49.21	.9	1.0	49.21	.9	1.0
Housing	998.10	12.4	14.4	612.00	11.3	12.6	863.12	15.0	16.8
Household Operation	390.70	4.8	5.6	206.66	3.8	4.2	258.31	4.5	5.0
House Furnishings	318.20	3.9	4.6	212.15	3.9	4.4	212.15	3.7	4.1
Clothing and Upkeep	662.64	8.2	9.5	461.24	8.5	9.5	461.24	8.0	9.0
Transportation	850.92	10.5	12.2	527.08	9.7	10.9	527.08	9.1	10.2
Automobile	727.12	9.0	10.4	512.08	9.4	10.6	512.08	8.9	9.9
Other	123.80	1.5	1.8	15.00	.3	.3	15.00	.2	.3
Medical and Dental	447.89	5.6	6 4	377.83	7.0	7.8	377.83	6.6	7.3
Personal Insurance	312.68	3.9	4.5	214.88	4.0	4.4	214.88	3.7	4.2
Personal Care	123.25	1.5	1.8	95.36	1.8	2.0	95.36	1.7	1.9
Recreation	388.78	4.8	5.6	203.23	3.8	4.2	203.23	3.5	3.9
Tobacco	93.60	1.2	1.3	94.12	1.7	1.9	94.12	1.6	1.8
Reading	46.36	.6	.7	32.10	.6	.7	32.10	.6	.6
Education	49.61	.6	.7	5.70	.1	.1	5.70	.1	.1
Gifts and Contributions	131.55	1.6	1.9	81.58	1.5	1.7	81.58	1.4	1.6
Miscellaneous	25.50	.3	.4	14.25	.3	.3	14.25	.2	.3
Union Dues	....	.....	.....	43.44	.8	.9	43.44	.7	.8

What happens to the proportion spent for housing when incomes and expenditures are changed out of the normal by inflation or deflation? A study of expenditures for current

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[1] *Monthly and Cost Budgets for Two Income Levels.* The Heller Committee for Research in Social Economics of the University of California, September, 1953.

·consumption was made in 1944 when family incomes in the United States had reached their highest level in history. Then $2,700 or less was received by those families and single persons in the lower 50 per cent bracket as compared with $1,900 or less received by those in the lower 50 per cent in 1941. About 42 per cent of those in the upper 50 per cent bracket had incomes above $3,000 after payment of taxes, whereas in 1941 only 20 per cent had incomes in this range. Although food and clothing each absorbed a larger share than previously of income in each level in 1944, housing costs, including fuel, light, and refrigeration remained the same or slightly lower in relation to income. The Heller report shows a similar trend based on the higher incomes of 1953. In the table on page 222 it is shown that for housing alone the percentage spent was from about 13 per cent to 17 per cent of the income after taxes. When the cost of household operations and house furnishings are added the percentage varied from 21 per cent to 26 per cent.

Calculations based on the table on page 224 shows that in 1944 from 21 to 35 per cent of the expenditures for current consumption were spent at different levels for housing, including fuel, light, refrigeration, and other operations. The larger percentages were for the lower incomes and expenditures.

These and other studies indicate that families must apportion from one-sixth to one-third of their expenditure for providing living quarters, including expenses for fuel, light, and refrigeration. As total family expenditures rise the money value of housing also increases but at a slower rate. Thus as the higher income levels are reached, expenditures for housing become a progressively small proportion of the cost of maintaining a family. The lowest percentage of the total is found in the top income brackets where expenditures for housing represent one-fifth or less of the total expenditures of families in large cities. Where incomes are $5,000 or above the expenditure is $1,000 or more. Usually this includes outlays for items in addition to the family home. Expenses for a vacation home, for lodging while traveling or on vacation,

AVERAGE MONEY INCOME, EXPENDITURE, AND SAVINGS OF FAMILIES AND SINGLE PERSONS IN CITIES BY INCOME CLASS, 1944 [1]

ITEM	ANNUAL MONEY INCOME AFTER PERSONAL TAXES								
	Under $500	$500 to $1,000	$1,000 to $1,500	$1,500 to $2,000	$2,000 to $2,500	$2,500 to $3,000	$3,000 to $4,000	$4,000 to $5,000	$5,000 and Over
Per cent of families in each class	4.2	7.7	7.1	11.9	13.9	13.2	19.9	9.6	12.5
Money income after personal taxes	$291	764	1,243	1,769	2,251	2,747	3,481	4,406	7,634
Expenditures for current consumption	$594	939	1,317	1,690	1,946	2,375	2,816	3,428	4,324
Food	$235	368	506	646	747	908	1,034	1,147	1,383
Clothing	41	82	157	231	268	353	456	621	836
Housing, fuel, light, and refrigeration	178	231	285	328	379	424	484	546	635
Housing operation	33	50	64	81	89	109	140	166	306
Furnishings and equipment	5	24	33	43	52	84	92	131	159
Automobile	6	13	36	42	61	104	122	175	171
Other transportation	6	21	28	47	53	52	63	83	114
Medical care	48	67	78	93	95	119	147	191	260
Personal care	12	20	34	42	46	55	64	84	109
Recreation	5	15	25	45	52	62	82	104	137
Tobacco	7	16	25	40	40	47	58	70	75
Reading	8	11	15	18	21	27	32	38	43
Formal education	1	2	1	8	8	14	13	29	41
Other	9	19	30	26	35	17	29	43	55
Personal taxes	1	23	70	124	198	283	407	564	2,357
Gifts and contributions	17	31	52	82	92	136	127	211	454
Net savings or deficit	−320	−206	−126	−3	213	236	538	767	2,856
War bonds	16	62	40	117	163	230	323	414	1,193
Life and annuity insurance premiums	10	20	43	50	64	80	108	141	269
Other	−346	−288	−209	−170	−14	−74	107	212	1,394
Average number of persons	1.42	1.82	2.11	2.55	2.77	3.00	3.61	3.97	4.02
Average number of earners	.38	.68	1.07	1.16	1.22	1.28	1.56	1.96	2.08

Personal taxes (income, poll, and personal property) have been deducted from income.

Includes rents for tenant occupied dwellings and for lodging away from home, and current operation expenses of home owners.

and for room rent at school are more common in the budgets of families with high incomes than they are among low-income families.

Pronounced inter-city and regional differences exist in the proportion of family expenditures allocated to housing at each income level. The laws of supply and demand function in areas to raise or lower the rental values according to the amount of crowding; the expenditures for fuel and light vary according to the climate. Thus expenditures for housing are high in large cities and in cold climates and lower in smaller cities and in warmer climates.

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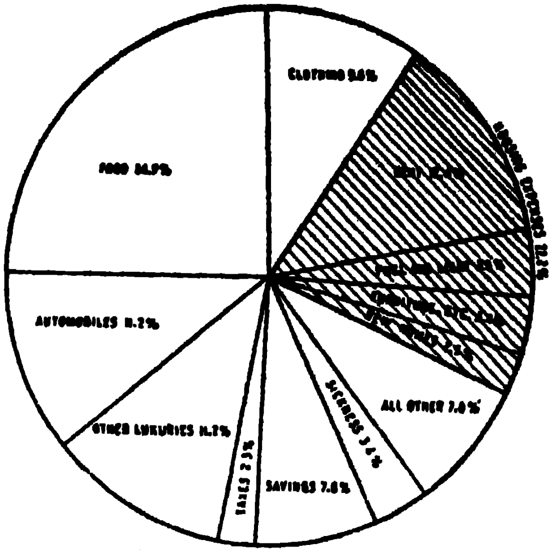
[1] "Expenditures and Savings of City Families in 1944," *Monthly Labor Review,* table 1, p. 2, Jan., 1946.



Courtesy Massachusetts Institute of Technology, and Bemis Industries, Inc.

Chart indicating the distribution of the family income and the amount which is often spent for shelter.

There are differences in the ratio of the amount spent on housing to total expenditures among the occupations. Families which derive their earnings chiefly from wage-earner pursuits usually allocate a smaller pecentage of their expenditures to housing than do families in the white-collar groups with similar incomes. In general, wage earners live in less desirable and smaller dwellings, which fact has significance because the families of wage earners at any given income level tend to be larger than those of the other occupational groups. The housing expenditures of families in the independent business and professional groups tend to be higher than those of families deriving their major earnings from other occupations. Professional persons maintaining their own offices may have their quarters in their homes and may therefore incur expenses for larger and more elaborate housing than would ordinarily be needed for the family home. Moreover, both professional and business persons who use their homes for entertaining business contacts may regard it to their advantage to maintain more costly establishments.

Housing is one of the few items of family consumption which is purchased as a unit rather than as a summation of individual purchases. For food and clothing expenditures, the more family members, the greater the outlay for family maintenance. For housing, on the other hand, the expenditures may remain relatively constant with the addition of a family member. To be sure, housing may become more costly if additional rooms are provided, but when the family adds a member it often crowds into the rooms available rather than seeking larger quarters.

Not always is the amount expended for shelter paid as rent. Many families own their own homes or are buying their homes on some amortization plan. In the first case, the housing costs include interest on the money invested in the dwelling and the lot, insurance, taxes, maintenance, and depreciation. In the second case, the monthly payments must cover an assigned share of all of these items, plus a provision for saving that will meet the requirements of the amortization plan. These costs should be studied carefully when contemplating any change in residence.

Suggested Activities

1. Determine trends on the land values in three different sections of your own community. Ascertain the relation between these and rental values in those sections.
2. What proportion of your family income do you believe to be justifiable to spend for shelter in the city in which you live?

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Problem 2. SHALL THE FAMILY OWN OR RENT ITS HOME?

Much has been written and more has been said concerning the whys and wherefores of home ownership. The desire of most people for ownership of homes has sometimes been termed "land hunger." Perhaps the origins of this desire date far back to the days when the many were serfs to the few, and home ownership meant personal freedom and coveted security. The lament of the poor woman out in the rain and the cold phrases well the satisfaction sought in home ownership.

Oh, to have a little house!
To own the hearth and stool and all!
The heaped up sods upon the fire,
The pile of turf against the wall!

To have a clock with weights and chains
And pendulum swinging up and down!
A dresser filled with shining delph,
Speckled and white and blue and brown!

I could be busy all the day
Clearing and sweeping the hearth and floor,
And fixing on their shelves again
My white and blue and speckled store!

I could be quiet there at night
Beside the fire and by myself,
Sure of a bed and loth to leave
The ticking clock and the shining delph!

And I'm praying God on high,
And I'm praying Him night and day,
For a little house—a house of my own—
Out of the wind's and the rain's way.[1]

The desire for home ownership played an important role in the colonization of America and later in the westward trek across the continent. Today some families relate with pride that for the seventh or tenth generation the land secured as a homestead claim or a grant by a remote forefather, still remains in the possession of his lineal descendants. There is permissible pride in being of a line that had the courage and fortitude to face the hardships and dangers of pioneer life. There is emotional satisfaction in having for one's own the huge oak grown from the acorns which great-grandfather carried westward in his pockets to plant on the prairie homestead he purposed to claim, or a lilac hedge, or tiger lily bed that attests to great-grandmother's efforts to bring to a new home place the loved beauty of her New England home. There is also emotional satisfaction in making a house and land of one's own become more beautiful through personal effort. Shared experience in the creation of visible beauty in the home plan and plantings tends to establish abiding bonds within the family circle.

Home ownership may increase the family's social prestige and strengthen its position in the community. Home owners are considered to be permanently identified with the community, and as such they are expected to assume more civic responsibility, their voice has more weight in community affairs. In this regard Herbert Hoover has said:

> A family that owns its home takes a pride in it, maintains it better, gets more pleasure out of it, and has a more wholesome,

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[1] Padraic Colum, "An Old Woman of the Roads," *Poems*, p. 90, New York, 1932. Reprinted by permission of the Macmillan Co., publishers.

healthful, and happy atmosphere in which to bring up children. The home owner has a constructive aim in life. He works harder outside his home; spends his leisure more profitably; and he and his family live a finer life and enjoy more of the comforts and cultivating influences of our modern civilization. A husband and wife who own their home are more apt to save. They have an interest in the advancement of a social system that permits the individual to store up fruits of his labor. As direct taxpayers they take a more active part in local government. Above all, the love of home is one of the finest instincts and the greatest of inspirations of our people.[1]

On the one hand the homeowner is master of his own dwelling. He cannot be ordered to move and the rent cannot be raised. He can make changes as he sees fit, and money spent for improvements adds to the value of his own property. His family feels a sense of security and finds encouragement in earning and saving to pay for the home or in making it more attractive. If a wise investment has been made there is an anticipated money-saving in ownership.

In the light of these points it would seem that the satisfactions of home ownership are deep and that they may overbalance whatever financial disadvantages there might be.

On the other hand, not all home ownership has proved satisfying. Most, if not all, communities have some ornate structure, at one time imposing, but now in advanced stages of dilapidation and decay. Designated locally as "Freeman's Folly," "Burton's Bust" or "Fool's Hill," such houses were planned as an expression of wealth rather than for the love of home, and their ownership brought poor returns. Also in most, if not all communities, there are, from time to time, charming small homes thrown on the market at sacrifice prices because "the owner has been moved by his company," "the young couple overbought for the size of their income" or "illness in the family necessitates selling for cash." In such cases home ownership has been the reverse of stabilizing in its effects on home life, the sense of security of the family members, and the emotional satisfactions of the family. If the purchase of a home exceeds the expenditures deemed normally sound, or if its purchase depletes the family savings so that it cannot meet the added demand of illness or the reverses of several months of unemployment, it may be regarded as ill-advised. Surely, a thoughtful consideration of certain criteria should be given home ownership before a decision is made in this important matter.

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[1] John M. Gries and James S. Taylor, *How to Own Your Home*, p. v, Foreword by Herbert Hoover. U. S. Department of Commerce, Bureau of Standards, Building and Housing Pub. BH17, 1931.

It is recognized that those families who are in the process of choosing between home ownership and renting have a difficult problem to solve. Its ramifications are bound up in a set of conditions summarized by Andrews thus: [1]

> (1) In rural life, home ownership is determined by the broader question of farm ownership versus tenancy.
>
> (2) Factory industry and modern commerce favor renting since the renter as a foot-loose person has often had an advantage in bargaining power.
>
> (3) The size of modern cities and the shifting character of their sections make it expensive to buy a house and sometimes uncertain to hold it because of shifting land values.
>
> (4) Size of income may make it very difficult or very easy to own.
>
> (5) Local conditions and traditions affect ownership.
>
> (6) Owning a home is desirable if the purchase is made at the right price which often means at the right time, since values fluctuate with the business cycle.

For a large number of families, buying a home would be classed as a major undertaking. It is the largest single money outlay that many a family makes in its whole history and in most cases is attempted only once in a lifetime. A family facing the prospect of home ownership may well give thought and take counsel as to proper criteria for determining the wisdom of such a plan. Certainly buying or building a home requires sound judgment if the personal needs of the family are to be met with the funds available. It involves the wise choice of location with respect to school and work and the selection of a desirable neighborhood. Decisions must be made as to size of house and type of construction, and plans for plumbing and heating systems must be considered along with a thousand and one other matters incident to building or remodeling a house. Plans for financing the purchase must be considered so that the transaction may be made on a sound business basis.

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[1] Benjamin R. Andrews, *Economics of Households*, Revised Edition, p. 255, New York, 1935. Reprinted by permission of the Macmillan Co.

In addition there are a number of arguments in favor of renting a home instead of owning it. It will often cost less to rent than to own, if the amount paid in taxes and the interest on the investment are considered. For the same expenditure, in some cases, a family can maintain a higher shelter standard by renting than by owning. If the family invested in sound securities the amount it would spend if it bought a home, frequently it can secure a larger money return upon its investment than the amount would yield if invested in a home. At no time is the renting family faced with fixed charges for maintaining its home. The renting family will never lose capital through decline in property values. There is an all-too-common belief that land values always increase or appreciate. Experience shows that they as frequently depreciate. Declining rents may result in reductions in shelter costs. The renting family is free of the responsibility for the upkeep and management of the property in which it lives; if it rents an apartment, it may be relieved of the responsibility for providing heat, utilities, or other operating expenses. The renting family can adjust easily to changing shelter needs. It is comparatively free to move when conditions become unsatisfactory or when better housing is available elsewhere. If its income is radically reduced, it can move to less expensive quarters to bring its shelter expense into line with its income. If the income increases, it can move to a better neighborhood. Then too, renting places the individual in a position of advantage in selling his services to his employer. He can bargain better because he is free to move to another town to take advantage of promotions or of available work. In case he loses his position he is not tied to the community in which he lives by his investment in his home.

Conversely, there are distinct disadvantages to renting. The renting family does not acquire an investment by its lifelong housing expenditure. Ordinary repairs cannot always be obtained when desired. A family may be unable to find the house it wants in the neighborhood desired. If "just the right house" is discovered, exorbitant rents may be demanded. In time of house scarcity the renting family may find itself without a house, facing high rents, or subject to overcrowding.

In every community there will always be a considerable number of families for whom home ownership is not timely. In the group will be included: the newly married couples and others who have not yet procured sufficient financial footing to assume the responsibility of such a purchase; the group seeking to ascertain by experience the desirability of a given section before committing itself to permanent residence; those, otherwise responsible, whose occupations are of an itinerant nature, or who have reason to believe that a change is imminent, and the more poorly paid families of the population who lack the means to purchase any dwelling.

Any family contemplating home ownership may wisely consider these questions: [1]

1. What is the family's annual income, and what will it probably be next year and the year after?
2. If business slackens, is the family breadwinner likely to lose his position or have his earnings reduced?
3. Will anyone else in the family be able to earn an income?
4. What does the family now pay for rent each year?
5. How much of the income is being saved?
6. How much could the family afford to pay out each year in paying for a house, and for the expenses that go with home ownership?

Because each family is unique there can be no absolute rules in the matter of home ownership. Each family must decide whether it is best for it to assume home ownership or to rent a home. To this end the family members must set up the advantages for each of these procedures and decide in the light of their own situation. Such a summary should contain a complete financial analysis. Once a decision is made, the family must be willing to abide by it, accepting the mistakes made or taking considerable financial loss in rectifying them.

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[1] John M. Gries and James S. Taylor, *How to Own Your Home*, p. 2, U. S. Department of Commerce, Bureau of Standards, Building and Housing Pub.

The final question as to whether home ownership is wise from the investment standpoint turns on the worth to the family of the experiences involved. Ellen H. Richards states that a family can afford to own its home only if the ownership sentiment is worth "the risk of losing half the investment; if they possess the fortitude to give up all they have lavished on it if duty calls; if they are willing to be bound hand and foot by unsalable real estate or by sentiment."

Suggested Activities

1. If your family owns its home state the advantages which home ownership has had for it. What disadvantages have there been?
2. If your family lives in a rented home what advantages have come to it from this method? What disadvantages?
3. How much does your family spend annually for its shelter? (a) If the home is rented? (b) If the home is owned? What percentage of the family income is this?

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Problem 3. WHAT LEGAL INFORMATION SHOULD A HOMEOWNER HAVE?

The stilted and involved phrasing characteristic of many legal documents, with numerous references to "party of the first part," "party of the second part," and other such ponderous statements, tends to confuse the understanding of the inexperienced lay person as to what the document is about. and what rights and prerequisites are really conveyed by it. Many homeowners are amazed, bewildered, and perplexed by the legalities attached to owning a home. This confusion results largely from a lack of knowledge as to the body of legal information important in home ownership, and in part from the unfamiliar phrasing employed in legal statements.

Legal information important to the homeowner includes the procedure employed in legal transfer of property, obligations to city, county, and state entailed by home ownership, the laws of the state concerning the ownership rights of husband and wife, the legalities of building permits, contracts and agreements, as well as those providing for mutual responsibility of the contracting parties in case the residence is rented or leased to another family. Families or individuals considering home ownership, or those who have already acquired homes, need an understanding of the legal procedures and forms which safeguard legal possession of real estate. Whosoever buys real estate for the purpose of a home ought to make sure of getting as clear and perfect title as is possible under the law.

The legal procedure for purchasing real estate usually falls into several rather clearly defined steps. These steps include expressing a desire for the property, entering into an agreement to purchase, depositing money in escrow, investigating the title, drawing up the deed, and registering the deed with the proper authorities. In cases where a loan must be arranged, the new owner must sign a promissory note secured by a mortgage. The latter instrument is also registered with the deed.

Expressing a desire for the property may be made directly to the owner or it may be made through a duly authorized and licensed real estate agent or broker.[1] This step usually follows an inspection of the property to determine its worth and suitability for family use. To prevent others from overbidding and thus raising the buying price, and to enable the buyer to inspect the abstract of title, usually a contract or an agreement to purchase is entered into whereby money is deposited in escrow with a disinterested third party. If the buyer deals directly with the owner, the money in escrow may be deposited at a bank; if he deals with a real estate agent, it may be deposited with the agent. If the buyer changes his mind and does not complete the transaction he usually forfeits the money paid in escrow. If the transaction is not completed because the owner changes his mind or is unable to furnish a clear title, the money is returned to the buyer.

It is important for the new owner to know what encum-

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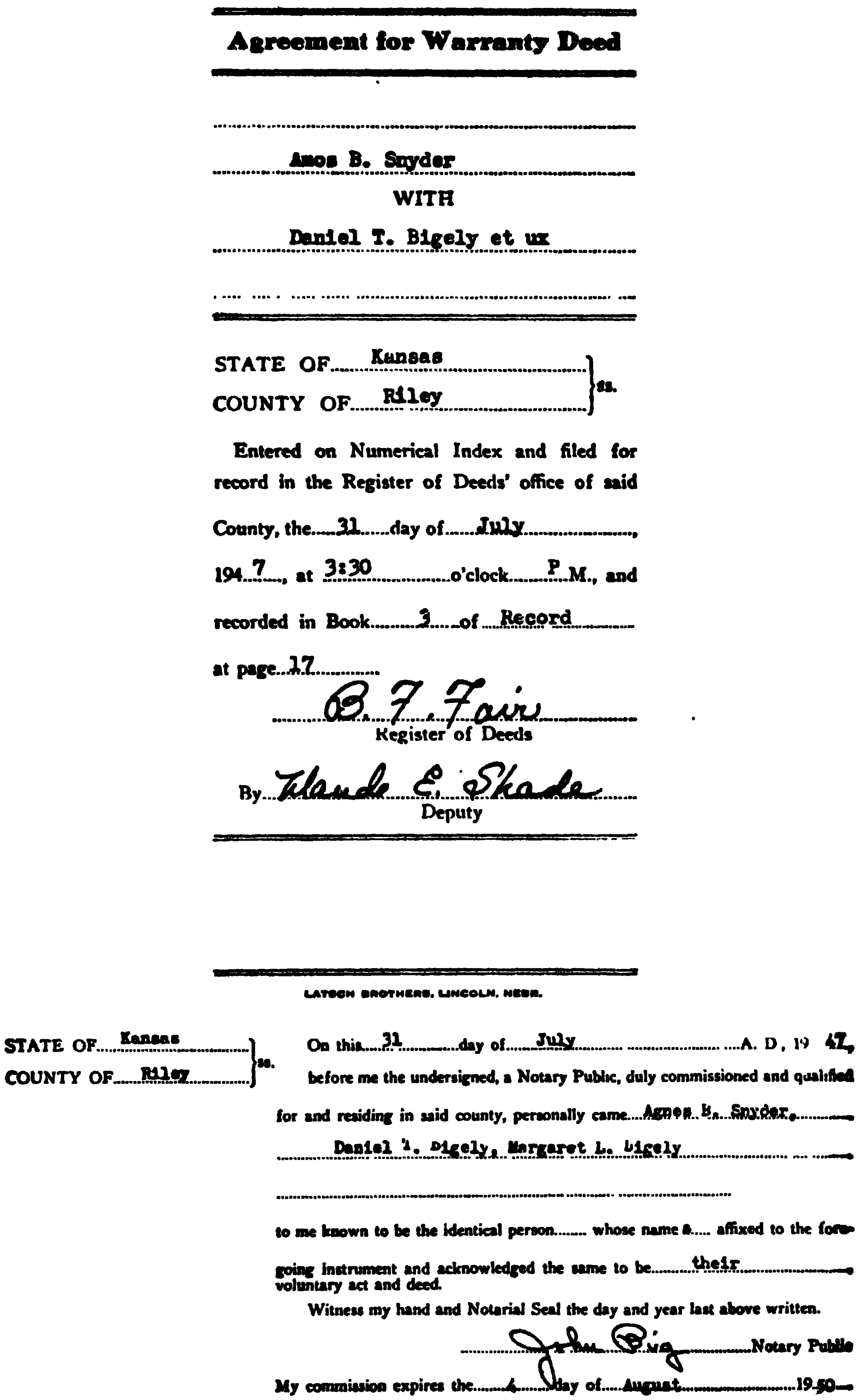
[1] The adjustment of housing demand to supply is to a great extent accomplished through the system of real estate brokerage. The broker brings buyers and sellers together. Though usually paid by the seller, the broker's service is used by both buyer and seller. His service consists on the one hand in judging the market and on the other hand of analyzing the buyer's needs and the extent to which they can be satisfied within the limitations of the market.



Agreement for Warranty Deed

Amos B. Snyder

WITH

Daniel T. Bigely et ux

STATE OF Kansas
COUNTY OF Riley } ss.

Entered on Numerical Index and filed for record in the Register of Deeds' office of said County, the 31 day of July, 1947, at 3:30 o'clock P.M., and recorded in Book 3 of Record at page 17

B. F. Fair
Register of Deeds

By Maude E. Shade
Deputy

LATSCH BROTHERS, LINCOLN, NEBR.

STATE OF Kansas
COUNTY OF Riley } ss.

On this 31 day of July A. D, 19 47, before me the undersigned, a Notary Public, duly commissioned and qualified for and residing in said county, personally came Agnes B. Snyder, Daniel T. Bigely, Margaret L. Bigely

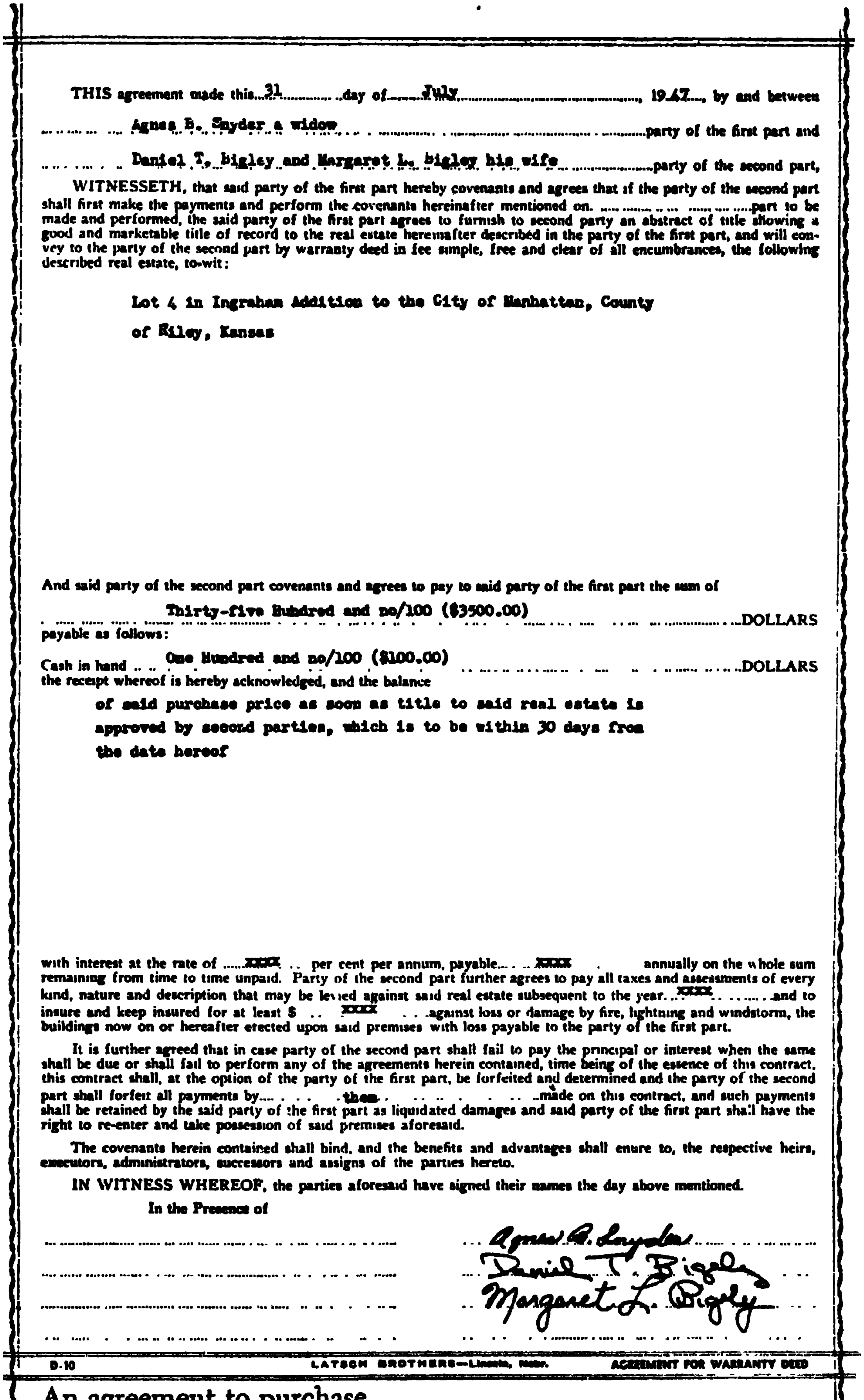
to me known to be the identical person whose name s affixed to the foregoing instrument and acknowledged the same to be their voluntary act and deed.

Witness my hand and Notarial Seal the day and year last above written.

Notary Public

My commission expires the 4 day of August 1950.

Outside pages of an agreement for Warranty Deed.



THIS agreement made this 31 day of July 1947, by and between Agnes B. Snyder a widow party of the first part and Daniel T. Bigley and Margaret L. Bigley his wife party of the second part,

WITNESSETH, that said party of the first part hereby covenants and agrees that if the party of the second part shall first make the payments and perform the covenants hereinafter mentioned on part to be made and performed, the said party of the first part agrees to furnish to second party an abstract of title showing a good and marketable title of record to the real estate hereinafter described in the party of the first part, and will convey to the party of the second part by warranty deed in fee simple, free and clear of all encumbrances, the following described real estate, to-wit:

Lot 4 in Ingraham Addition to the City of Manhattan, County of Riley, Kansas

And said party of the second part covenants and agrees to pay to said party of the first part the sum of Thirty-five Hundred and no/100 ($3500.00) DOLLARS payable as follows:

Cash in hand One Hundred and no/100 ($100.00) DOLLARS the receipt whereof is hereby acknowledged, and the balance of said purchase price as soon as title to said real estate is approved by second parties, which is to be within 30 days from the date hereof

with interest at the rate of XXXX per cent per annum, payable XXXX annually on the whole sum remaining from time to time unpaid. Party of the second part further agrees to pay all taxes and assessments of every kind, nature and description that may be levied against said real estate subsequent to the year XXXX and to insure and keep insured for at least $ XXXX against loss or damage by fire, lightning and windstorm, the buildings now on or hereafter erected upon said premises with loss payable to the party of the first part.

It is further agreed that in case party of the second part shall fail to pay the principal or interest when the same shall be due or shall fail to perform any of the agreements herein contained, time being of the essence of this contract, this contract shall, at the option of the party of the first part, be forfeited and determined and the party of the second part shall forfeit all payments by them made on this contract, and such payments shall be retained by the said party of the first part as liquidated damages and said party of the first part shall have the right to re-enter and take possession of said premises aforesaid.

The covenants herein contained shall bind, and the benefits and advantages shall enure to, the respective heirs, executors, administrators, successors and assigns of the parties hereto.

IN WITNESS WHEREOF, the parties aforesaid have signed their names the day above mentioned.

In the Presence of

Agnes B. Snyder
Daniel T. Bigley
Margaret L. Bigley

D-10 LATSCH BROTHERS—Lincoln, Nebr. AGREEMENT FOR WARRANTY DEED

An agreement to purchase.

brances, if any, are extant against the property and if all transfers and inheritances have been completed.

In the course of years, land that has been subjected to a series of transfers, encumbrances, and tax levies will present a complicated record. Often an abstractor who is versed in real estate law and practice must be employed to trace out the record as an aid in determining the validity of the title. He shows in a written document called an abstract of title all of the transactions covering a piece of real estate from the time the property was granted from the government down to the current transaction. The document does not indicate that the title is either clear or sound but merely certifies that the abstracts that have been issued are true and faithful copies of all records covering the land in question. In cases of titles of great complexity a competent attorney should pass upon the validity of the title.

It may be well to define the manner in which these encumbrances affect the title to real estate. Any encumbrance on real estate is a lien, or a charge upon the property by which it is made security for a debt or other obligation. In this way court judgments, unpaid taxes and assessments, mortgages or any specific charges against property are liens. A judgment is a decision of a court as a result of a suit. This judgment becomes a lien or charge against real estate owned by the person against whom judgment has been taken. Suits for any debts held by a mechanic, a contractor, or by any one else may be brought and they may become judgments. If real estate against which a judgment is filed should be sold, an equivalent part of the proceeds of the sale would be taken by the court to satisfy the judgment.

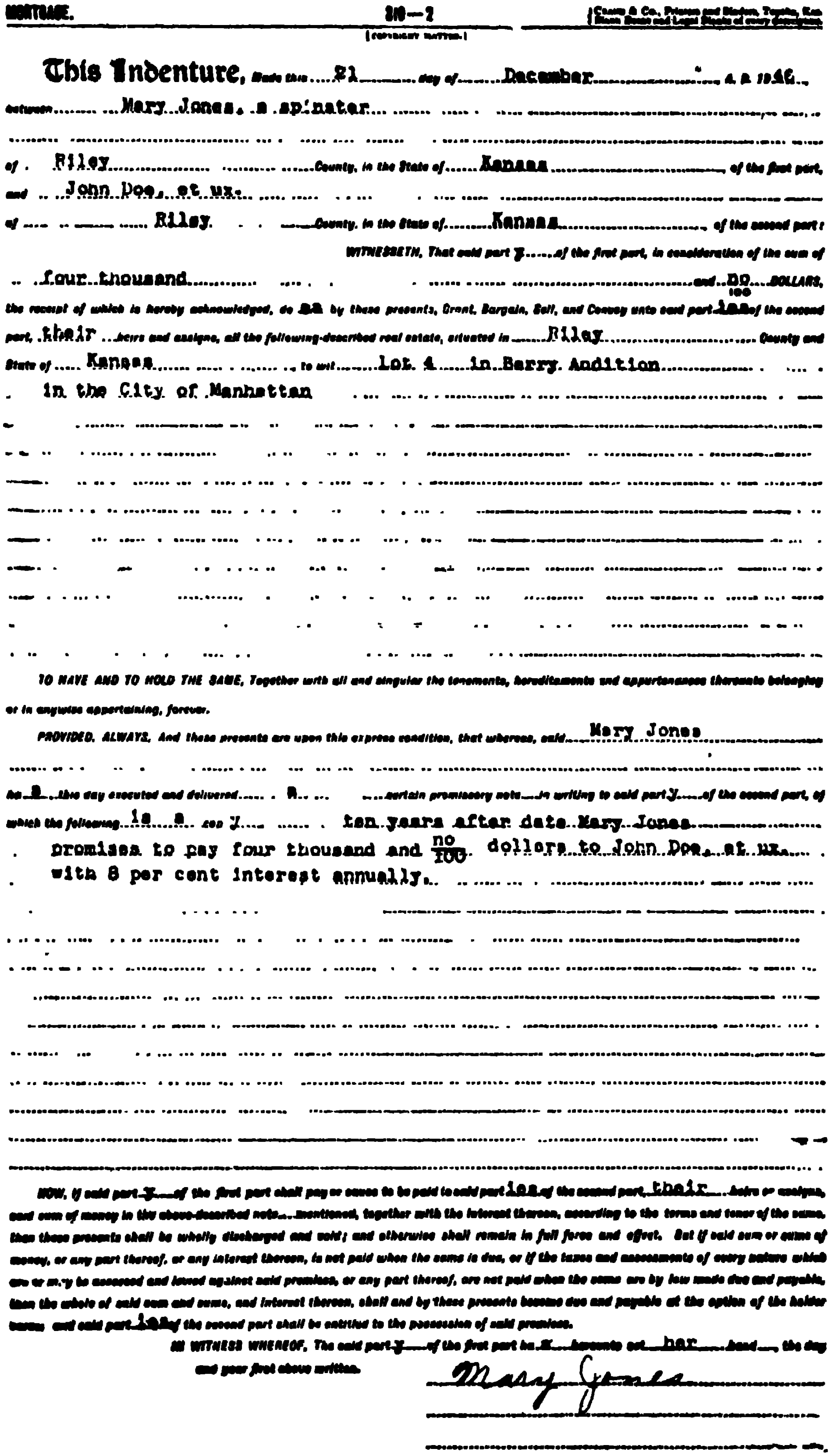
Taxes and assessments due and unpaid on real estate after some years become a lien against it. If they are allowed to accumulate for a certain length of time the property may be sold to pay them. To get a clear title to real estate all back taxes must be paid either by the previous or the new owner. In this connection it might be well to point out that the homestead tax-exemption movement has developed to counteract this state of affairs. The movement began in Texas in

1930 and it undertook to make it cheaper and safer to own homes than to rent them. The amendment to the Constitution of Texas exempted $3,000 of the assessed valuation of homesteads. Other states now have homestead tax exemptions varying from $500 to $5,000. It has been found that the total of homestead values eligible to benefit by the legal exemption is but a small part of the total lawfully taxable property of a state, but the amount of the taxes per individual family would be enough to relieve a situation in which America is fast becoming a nation of renters instead of home owners.

A common specific lien is that filed against property, either real or personal, for work performed, generally in the erection of a building. In this case it is known as a "mechanic's lien." Such a lien to be legal must be filed in the office of the proper official. Because the law gives contractors and subcontractors a period of time in which to file a lien against property, it is not always possible to ascertain from public records whether or not such a lien is pending. It is well, therefore, in purchasing newly erected buildings, to make sure that all payments for work have been met in full.

A mortgage on real property is a lien upon the land as security for the performance of some obligation, such as the payment of a debt, to become void upon such performance. In case of failure to meet the obligation at the specified time the land becomes the property of the holder of the mortgage after proceedings of foreclosure. In this way a mortgage is both a lien in equity and a conveyance at law. A mortgage is negotiable and remains a lien upon the property when real property is transferred. Hence, anyone placing a mortgage upon his home should realize the importance of fulfilling all points of the mortgage contract. Likewise anyone acquiring a home should investigate the possibility of an unfulfilled mortgage obligation being passed with the title to his land.

Property ownership entails certain obligations to the city, township, county, and state, whose governments are supported by money raised through taxation. Real estate, in-



MORTGAGE. 310—2 (Copyright Matter.) Crane & Co., Printers and Binders, Topeka, Kan. Blank Books and Legal Blanks of every description.

This Indenture, Made this 21 day of December A. D. 1946, between Mary Jones, a spinster

of Riley County, in the State of Kansas, of the first part,

and John Doe, et ux.

of Riley County, in the State of Kansas, of the second part:

WITNESSETH, That said party of the first part, in consideration of the sum of four thousand and no/100 DOLLARS, the receipt of which is hereby acknowledged, do es by these presents, Grant, Bargain, Sell, and Convey unto said parties of the second part, their heirs and assigns, all the following-described real estate, situated in Riley County and State of Kansas, to wit: Lot 4 in Barry Addition in the City of Manhattan

TO HAVE AND TO HOLD THE SAME, Together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in anywise appertaining, forever.

PROVIDED, ALWAYS, And these presents are upon this express condition, that whereas, said Mary Jones has this day executed and delivered a certain promissory note in writing to said party of the second part, of which the following is a copy:

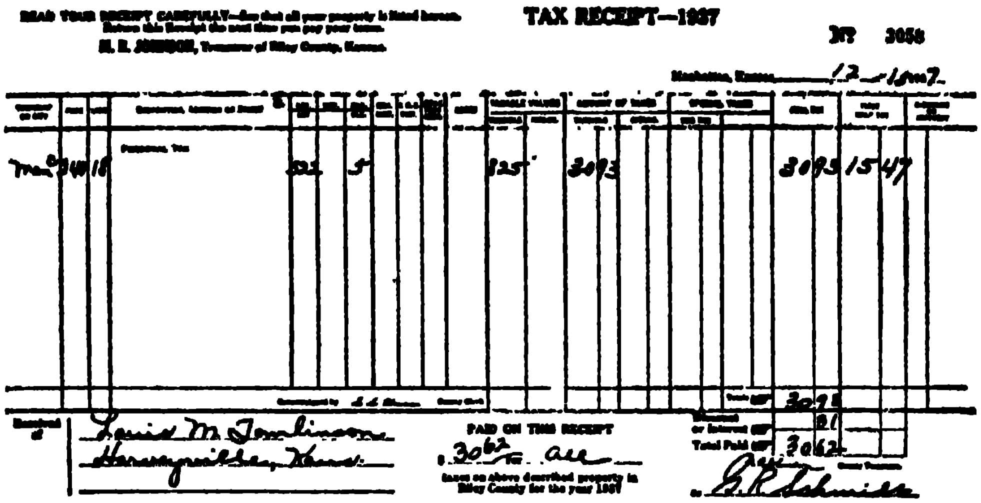
ten years after date Mary Jones promises to pay four thousand and no/100 dollors to John Doe, et ux. with 8 per cent interest annually.

NOW, if said party of the first part shall pay or cause to be paid to said parties of the second part, their heirs or assigns, said sum of money in the above-described note mentioned, together with the interest thereon, according to the terms and tenor of the same, then these presents shall be wholly discharged and void; and otherwise shall remain in full force and effect. But if said sum or sums of money, or any part thereof, or any interest thereon, is not paid when the same is due, or if the taxes and assessments of every nature which are or may be assessed and levied against said premises, or any part thereof, are not paid when the same are by law made due and payable, then the whole of said sum and sums, and interest thereon, shall and by these presents become due and payable at the option of the holder hereof, and said parties of the second part shall be entitled to the possession of said premises.

IN WITNESS WHEREOF, The said party of the first part has hereunto set her hand, the day and year first above written.

Mary Jones

This is a mortgage form.



TAX RECEIPT—1937

Louis M. Tomlinson
Harveyville, Kans.

PAID ON THIS RECEIPT

$30.62 all

Total Paid 30.62

This is a tax receipt.

cluding the buildings on it, bears its share of this burden. These taxes must be paid annually and as has been stated previously a clear title to real estate is jeopardized by non-payment. In addition to the general taxes, real estate owners in incorporated towns and cities are open to assessments against their property for certain improvements which the city wishes to make within its limits. For instance, a newly laid pavement or sewer may be partially paid for through an assessment imposed upon property bordering on or situated so near the improvement as to be supposedly benefited by it. Such as assessment is laid with reference to the benefit which such property is supposed to receive by the expenditure of the money. Anyone assuming home ownership should investigate to see that all such assessments made have been paid and if any further assessments are in the offing.

When it is apparent that all encumbrances have been removed or declared and that all claims from inheritances have been satisfied, then arrangements for payment of the remainder of the purchase price are made and a deed is drawn up. Whenever a transfer takes place from one owner to another of the estate in land, the process is called "passing the title." A perpetual right to occupy and use real estate to the exclusion of all other persons constitutes an absolute estate in the land. An estate in fee simple runs forever to the owner and his heirs, and it includes every qualification or restriction respecting the persons who may inherit it as heirs. Beyond a title in fee simple there is no other interest; it is the fullest and most absolute estate, or claim, that can be had in lands.

Title to real estate can be transferred from the legal owner of the land to another only by a prescribed legal form, customarily a deed. A deed is a written document transferring an interest in real estate from one owner to another and it is popularly understood as a means of conveyance of land in fee simple. It derives its name from an old phrase used when land was transferred, "Now the deed is done." It does not necessarily express the terms of the contract of sale but it does transfer the title to the land. A deed is considered to be completed when it has been duly signed by the grantor and grantee, delivered to the new owner and recorded in the proper office, usually that of the registrar of deeds. The forms of deeds range from the highest, the full covenant and warranty deed, to the lowest, the quit-claim deed. Each of these deeds has its own characteristics, and each, except the last, contains one or more covenants for the benefit of the new owner.[1] Any kind of a deed serves as the conveyance of the title and is legally effective when it is registered with the proper authority.

In case the purchase price of the home cannot be paid in full by the new owner, he must make an arrangement for a loan to pay the balance. The amount of the loan is covered by a promissory note and secured by a mortgage on the real estate. This, of course, is a new mortgage. The mortgage sets forth the time and method of repayment of the loan and provides for forfeiture of the real property in case these requirements are not met. Several different methods of repayment of mortgages described in Problem 5 are used. Because they are a conveyance at law and a lien against the property they are registered with the same authority as the deeds.

The full covenant and warranty deed contains six covenants which protect the new owner against any of the well-known rights which some other person or persons may have in the land being transferred. A full covenant and warranty deed is the most desirable form of deed known to law, but a deed of general warranty is more common and is usually acceptable. By this deed, if the title fails wholly or in part, and the new owner is ousted by a superior title, the original owner must compensate the new owner for the consequent loss.

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[1] For a more complete discussion of deeds see John B. Green, *Law for the Home Owner*, Chap. 7–8. The Macmillan Co., New York, 1926.

The function of a quit-claim deed is to nullify an outstanding claim to an interest in the land. Its use is to assure peace from disturbance of the new owner by persons lawfully laying claims to the premises. It is sometimes demanded from persons who may have had a remote claim through inheritance. Because it operates to withdraw all interest in the land it describes and conveys, a quit-claim deed is obtained to make the title clear. A quit-claim deed may be used for other purposes. It guarantees nothing to the new owner but the transfer of whatever interest the previous owner may have had in the property. The title may be at fault; the property may be subject to mortgages, judgments or unpaid taxes. Under a quit-claim deed the purchaser could not recover losses for such liens from the former owner.

If the buyer of real estate takes a full covenant and warranty deed or a general warranty deed, he should make sure that there is included a covenant against incumbrances. Such a covenant covers mortgages, court judgments, taxes and assessments due, or any other liens whether known or unknown to the previous owner. The breach of a covenant against encumbrances holds the previous owner responsible for any loss incurred by it.

Among the legal points not always understood are the respective rights of husband and wife in the ownership of real estate. Of course, an ideal marriage is a true partnership and in it the one partner would desire that any property belonging to him should belong also to the other. In practice, however, ideas of marriage are not and have not always been ideal. Formerly full title to a woman's property passed to her husband at marriage and undoubtedly by this procedure some women were deprived of their just property

INDE[illegible]

DEED.

GENERAL WARRANTY.

FROM

Geo. H. Lapham,

et ux

TO

Edna B. Snyder

Entered in Transfer Record in my office this 17

day of Dec A.D. 1924

E. J. [illegible]
County Clerk.

State of Kansas, Riley County, ss.

This instrument was filed for record on the 17th

day of Dec A.D. 19 24

at 11 45 o'clock A. M., and duly recorded in

Book 161, on page 618

Fee, $ [illegible]

Mrs. A. M. [illegible]
Register of Deeds.

Entered according to act of Congress, in the year [illegible], by Geo. W. Crane and Henry M. Spalding, in the office of the Librarian of Congress, at Washington.

CRANE & CO., TOPEKA

State of Kansas, Riley County, ss.

BE IT REMEMBERED, That on this ______ day of December A. D. 19 24 before me, the undersigned, a Notary Public in and for the County and State aforesaid, came Geo. H. Lapham and Lillie B. Lapham, husband and wife

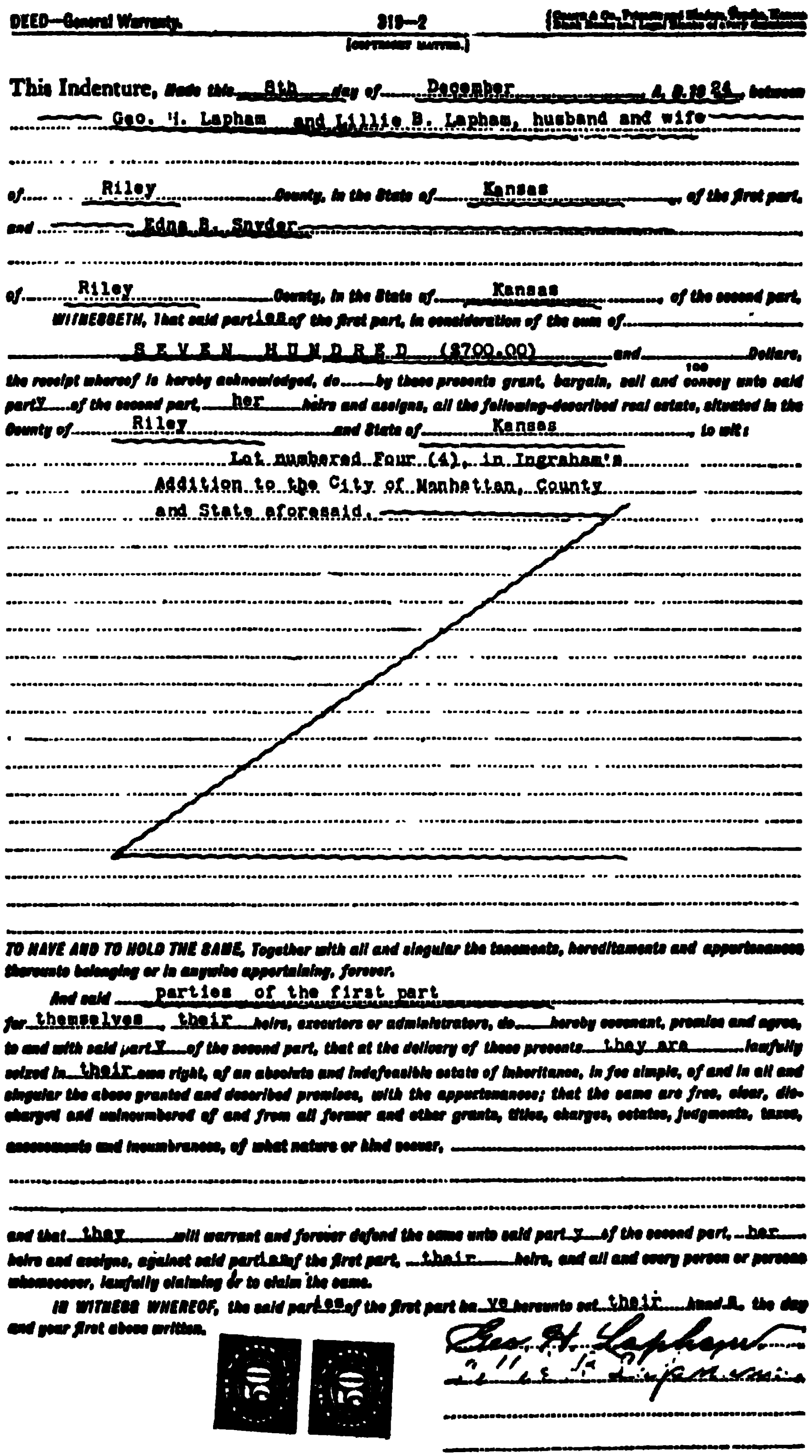
who are personally known to me to be the same persons who executed the within instrument of writing, and such persons duly acknowledged the execution of the same.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Notary Public.

[illegible]

My Commission Expires Aug. 10, 1925



DEED—General Warranty. 319—2 [illegible]

([illegible])

This Indenture, Made this 8th day of December A. D. 19 24, between Geo. H. Lapham and Lillie B. Lapham, husband and wife

of Riley County, in the State of Kansas, of the first part,

and Edna B. Snyder

of Riley County, in the State of Kansas, of the second part,

WITNESSETH, That said parties of the first part, in consideration of the sum of SEVEN HUNDRED ($700.00) and $\frac{}{100}$ Dollars, the receipt whereof is hereby acknowledged, do by these presents grant, bargain, sell and convey unto said party of the second part, her heirs and assigns, all the following-described real estate, situated in the County of Riley and State of Kansas, to wit:

Lot numbered Four (4), in Ingraham's Addition to the City of Manhattan, County and State aforesaid.

TO HAVE AND TO HOLD THE SAME, Together with all and singular the tenements, hereditaments and appurtenances thereunto belonging or in anywise appertaining, forever.

And said parties of the first part for themselves, their heirs, executors or administrators, do hereby covenant, promise and agree, to and with said party of the second part, that at the delivery of these presents they are lawfully seized in their own right, of an absolute and indefeasible estate of inheritance, in fee simple, of and in all and singular the above granted and described premises, with the appurtenances; that the same are free, clear, discharged and unincumbered of and from all former and other grants, titles, charges, estates, judgments, taxes, assessments and incumbrances, of what nature or kind soever,

and that they will warrant and forever defend the same unto said party of the second part, her heirs and assigns, against said parties of the first part, their heirs, and all and every person or persons whomsoever, lawfully claiming or to claim the same.

IN WITNESS WHEREOF, the said parties of the first part have hereunto set their hands, the day and year first above written.

Geo. H. Lapham

The outside of a general warranty deed.

rights upon their marriage. At present, each state has its own laws establishing the rights of husband and wife to real estate and other property. In most states, legally, husband and wife are not one but separate entities. If the wife possesses property at the time of marriage it remains hers unless she makes other arrangements. She may acquire and hold property, both real and personal, and it is not subject to the husband's control or liable for his debts. So far as property is concerned, a married woman in most states has all the rights and privileges of an unmarried woman. Likewise, the husband has certain separate property rights secured by law. In a large number of states husband and wife have equal property rights. A few states hold that all property acquired during marriage, by either husband or wife, except possibly that received by gift, belongs equally to both. Generally, all property owned prior to the marriage remains the separate property of each.

In some states today a widow has the same dower rights that she had at common law. That is, she has a one-third interest for life in her husband's real property whether there are children or not. In some states she can claim one-half of all the property. By will, of course, she may be allowed more of the property, as a will is also a recognized document for conveyance of the title for real estate. It is possible to phrase a joint deed to real estate so that the wife or husband is possessed of the whole property on the death of the other. A conveyance by deed from husband to wife without a valuable consideration, however, is regarded as fraudulent against his creditors in most states.

Concerning the passing of the title of real estate from one party to another the laws of the different states vary. Some states require the signature of both the husband and the wife in the transfer of any realty, and irrespective of law this is the common practice in most, if not all, states. It is essential to be informed on the requirements of a state in order to be sure that a clear title has been passed.

Not only in securing a clear title to land, but also in building, there are legalities to be considered and observed. In cities where building regulations or zoning are a part of the ordinances it is necessary to apply to the city clerk for a building permit before proceeding. The practice of requiring a building permit is a protection to a homeowner as well as a curb on the inclinations of those who desire to place a filling station on every corner lot.

Another legal document which the person who plans to build a house will sign is the contract, drawn up to cover the agreement between the builder and the owner. The contractor or builder figures the cost of building in detail on the basis of what is wanted. When he has this cost on paper and the owner has approved, they enter into a written agreement in which the obligations of each are stated and in which each agrees to fulfill these obligations. Suggestions for procedure in regard to such contracts follow:

> Contract documents include the *Agreement* between the Contractor and the Owner, the *General Conditions*, the *Specifications*, and the *Working Drawings*. Before these documents are prepared, the laws of the State and the regulations and ordinances of the particular community covering building operations should be consulted. It is also important that these documents be properly prepared and filed as a protection to the owner against possible losses which might result from failure to present them to the proper local authority.
>
> In preparing these documents, provisions should be included for each part of the building process as well as definite statements concerning the respective responsibilities of all persons signing the contract. Since these documents form the basis upon which all work is done and all costs are figured they must be specific and complete.[1]

The specifications for the items in the list on page 248 should include descriptions of the finished work and should be a part of each construction contract.[2]

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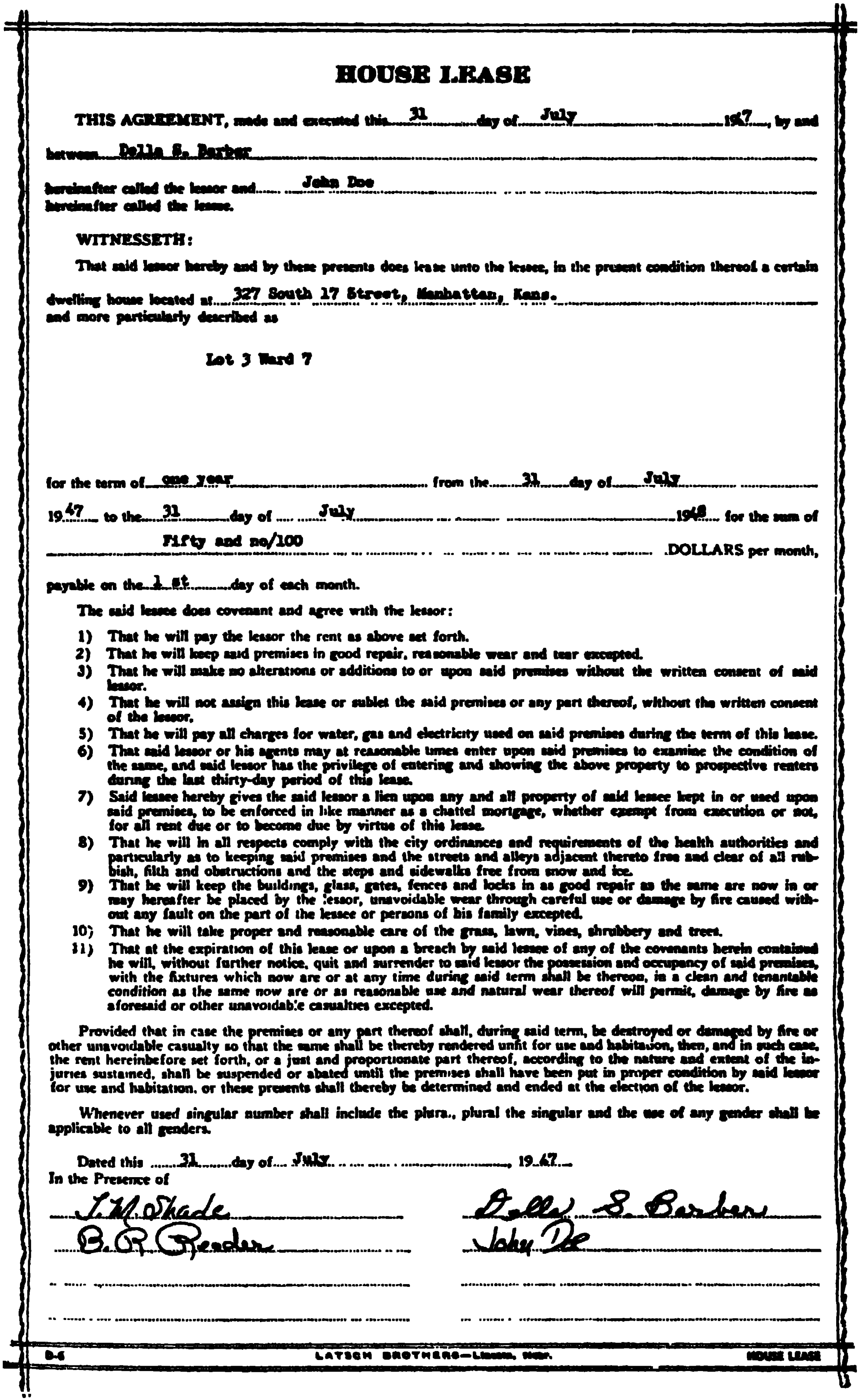
[1] *Contract Documents for Small House Construction*, p. 2. Federal Housing Administration, Technical Bulletin 3, Revised June 15, 1936.

[2] *Ibid.*, adapted.

1. Clearing site
2. Excavation
3. Backfill and grading
4. Footings
5. Foundations walls
6. Cellar floors
7. Chimneys
8. Outside steps, porches, terraces and walls
9. Walks and driveways
10. Framing
11. Exterior walls
12. Roof
13. Sheet metal
14. Ornamental and structural iron and steel
15. Interior wall and ceiling finishes
16. Trim
17. Windows and doors
18. Rough hardware
19. Screens and storm sash
20. Closets
21. Built-in accessories
22. Finish floors
23. Painting
24. Glazing
25. Finish hardware
26. Plumbing
27. Heating
28. Electric work
29. Equipment
30. Miscellaneous
31. Garage

The owner should check the specifications carefully to understand fully what they do or do not include. Usually he should prepare himself to meet costs additional to those included in the list. These are the charges incident to moving into his house and may include such items as connecting with the public utilities, water, gas, and electricity, and installing certain mechanical equipment. He should also recognize that any changes and additions made after the contract is signed would have a cost additional to that quoted in the contract.

The homeowner who may rent his property needs additional information concerning the mutual legal responsibilities of the contracting parties. Property may be rented from month to month or for a longer time through the use of a lease. A notice of one month usually must be given by either party to terminate the relations in the first instance, that is, a landlord cannot force a tenant to move without giving a month's notice, and likewise a tenant can be forced to pay a month's rent if he vacates without giving a month's notice. A lease is a contract for the letting of a piece of prop-



HOUSE LEASE

THIS AGREEMENT, made and executed this 31 day of July 1947, by and between Della S. Barber

hereinafter called the lessor and John Doe
hereinafter called the lessee.

WITNESSETH:

That said lessor hereby and by these presents does lease unto the lessee, in the present condition thereof a certain dwelling house located at 327 South 17 Street, Manhattan, Kans.
and more particularly described as

Lot 3 Ward 7

for the term of one year from the 31 day of July 1947 to the 31 day of July 1948 for the sum of Fifty and no/100 DOLLARS per month, payable on the 1 st day of each month.

The said lessee does covenant and agree with the lessor:

1) That he will pay the lessor the rent as above set forth.
2) That he will keep said premises in good repair, reasonable wear and tear excepted.
3) That he will make no alterations or additions to or upon said premises without the written consent of said lessor.
4) That he will not assign this lease or sublet the said premises or any part thereof, without the written consent of the lessor.
5) That he will pay all charges for water, gas and electricity used on said premises during the term of this lease.
6) That said lessor or his agents may at reasonable times enter upon said premises to examine the condition of the same, and said lessor has the privilege of entering and showing the above property to prospective renters during the last thirty-day period of this lease.
7) Said lessee hereby gives the said lessor a lien upon any and all property of said lessee kept in or used upon said premises, to be enforced in like manner as a chattel mortgage, whether exempt from execution or not, for all rent due or to become due by virtue of this lease.
8) That he will in all respects comply with the city ordinances and requirements of the health authorities and particularly as to keeping said premises and the streets and alleys adjacent thereto free and clear of all rubbish, filth and obstructions and the steps and sidewalks free from snow and ice.
9) That he will keep the buildings, glass, gates, fences and locks in as good repair as the same are now in or may hereafter be placed by the lessor, unavoidable wear through careful use or damage by fire caused without any fault on the part of the lessee or persons of his family excepted.
10) That he will take proper and reasonable care of the grass, lawn, vines, shrubbery and trees.
11) That at the expiration of this lease or upon a breach by said lessee of any of the covenants herein contained he will, without further notice, quit and surrender to said lessor the possession and occupancy of said premises, with the fixtures which now are or at any time during said term shall be thereon, in a clean and tenantable condition as the same now are or as reasonable use and natural wear thereof will permit, damage by fire as aforesaid or other unavoidable casualties excepted.

Provided that in case the premises or any part thereof shall, during said term, be destroyed or damaged by fire or other unavoidable casualty so that the same shall be thereby rendered unfit for use and habitation, then, and in such case, the rent hereinbefore set forth, or a just and proportionate part thereof, according to the nature and extent of the injuries sustained, shall be suspended or abated until the premises shall have been put in proper condition by said lessor for use and habitation, or these presents shall thereby be determined and ended at the election of the lessor.

Whenever used singular number shall include the plural, plural the singular and the use of any gender shall be applicable to all genders.

Dated this 31 day of July, 1947.
In the Presence of

T. M. Shade Della S. Barber
B. R. Reader John Doe

B-6 LATSCH BROTHERS—Lincoln, Nebr. HOUSE LEASE

The usual form of a house lease.

erty by the owner to a renter for a specific period of time in consideration of a stipulated rental. The most common covenants are that the lessee shall pay rent, prevent destruction on the premises, and shall have exclusive possession, or right to quiet enjoyment of the property by reason of his interest in it. The landlord shall pay the taxes and have a right to inspect the premises to see that they are kept in good condition. Usually there is no implied warranty that a house which is leased is fit for the purposes for which it is rented. The lessee has an opportunity to inspect the premises before entering into an agreement and so no further duty rests upon the landlord. If, however, an agreement to repair is made and is not carried out within a reasonable time, the tenant has the legal right to repair and deduct costs from the rent or vacate and be discharged from the rent entirely. Under a lease a landlord cannot require a tenant to vacate before the expiration of the lease, and a tenant is responsible for all rentals until the expiration of the lease.

Although the formality of the phrasing used in legal documents is confusing to the average person, anyone considering home ownership should surmount the barrier which legal diction imposes, and become intelligently informed as to the procedures used in the transfer of property. Important also is information on the characteristics of various types of deeds, and the ownership rights of husband and wife, the obligations to city, county, and state entailed by home ownership, and the legalities of building permits, contracts, and agreements. The old rule that one should *read* and *understand* any document before signing it is still in force as an unwritten law.

Suggested Activities

1. What legal steps are necessary to secure a clear title when real estate has been transferred?
2. What property rights has a wife in your state? What are the laws of inheritance in regard to real estate?
3. What legal procedures are necessary when building a house?
4. What zoning ordinances are in force in your community? Do they differ from those in other communities?

5. What are the usual terms of a house lease in your community?

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Problem 4. WHAT AMOUNT CAN SAFELY BE SPENT FOR HOME OWNERSHIP?

The point of view that sees home ownership as a combination of buying shelter and investing savings and that sees the expenditures involved in relation to other requirements of the income is important if financial difficulties are to be avoided. The cost of shelter over a period of years is the difference between what has been spent for the house during that period and its value as the period closes. An estimate of what can be afforded in a house should consider the annual costs of home ownership of a house free from debt, the annual costs of upkeep and taxes and the costs of financing any necessary loan for the period, the recognized relationships between the cost of a house and the income, and other pertinent factors.

Even if a family has ample cash for the full payment of the sort of house its members desire, the expenditure should not be made until careful thought is given to various annual commitments that go with the ownership of the house. The taxes must be paid, insurance must be carried, provision must be made for repairs and improvement, and the property will depreciate in value. Not infrequently, one sees a fine manor house or a once beautiful plantation home in a state of dilapidation, listed for tax sale because the owners, owing to financial reverses, are unable to provide the necessary annual expenditures for the upkeep of the property. In other cases the purchase of the home was not related to the income, and although the necessary expenditures are met, family life is pauperized of other values to provide shelter. One can understand the bitterness of the boy who pointed to the great pile that was his residence and said, "If granddad had not been generous enough to build that for mother I would have had a college education. It has taken all we could rake and scrape to keep it in shape to reflect glory on the generous donor. It is like a dragon taking the very life of the young people of the family." That house was unrelated to the income and life of its owners.

As stated above the cost of owning and living in one's own home clear of debt involves the following items: taxes and special assessments, repairs and maintenance, hazard insurance, obsolescence, and interest on the investment.

The method of levying and the rate of taxation for real estate differ among cities and in various parts of the country. In most cases the taxes are assessed on a proportion of the full market value, but the type of items for which the general real estate tax is levied may vary. Furthermore, the tax rate may be uniform throughout the community or different in the various sections of the city. Although the tax is usually figured on a mills levy per $1,000 assessed valuation, two and a half per cent of the market valuation is a reasonable estimate for urban areas. When special improvements, such as paving, building of storm sewers, or installation of curbing, are made in an area, taxation to support these improvements may be shared throughout the city, or it may be wholly or partially assessed against the property benefiting most directly from the improvement. In some cities water tax, upkeep of the streets, and similar items are not included in the general property tax but are assessments against each property.

Included as repairs and replacements are those expenditures for replacing or renovating worn parts and which, therefore, maintain rather than add to the value of the home. These expenditures do not occur annually, but the amount is usually substantial when it does occur. Repairs are postponable expenses, but such postponement may damage the house, quicken depreciation, and result in a major repair outlay. Although these expenditures are usually light for a new house they normally increase with the age of the house. During the first years allow about one and a half per cent of the market value, but increase this to two or two and a half per cent during the later years. Homeowners who can make the repairs themselves can, of course, allow less.

Hazard insurance includes insurance against loss from fire, tornado, and other storms. The term of such insurance policies is from three to five years, and the premium is usually paid at the beginning of the term. Annually this amounts to from one-fourth to one-half of one per cent of the market value of the house. The cost depends upon the extent of the coverage and the hazards involved. For instance, certain types of roofing cost less to insure than others.

After the passage of time the value of most houses suffers from obsolescence. This may come about gradually through natural deterioration, but rapid obsolescence may come from changing fashions in home design, deteriorating neighborhood conditions, the invasion of unwanted population elements, or the retreat of population from it to newer areas.

It is difficult to determine probable loss through obsolescence, but authorities designate from less than one per cent to around five per cent annually.

If money invested in home ownership were invested in some other way, a substantial return might be received over a period of years. The homeowner forgoes income on this amount and it should be counted as a cost against home ownership. Depending on current rates of interest, as much as two and one-half per cent return might be figured for this.

The homeowner often has other expenses which a home renter does not have. Owners always have the expenses for fuel, light, and refrigeration which may or may not be included in a rental price. If structural additions or improvements are made the homeowner must bear the cost. Transportation and community services may be more expensive if the homeowner is located away from the business centers in a new, remote, and fashionable neighborhood. These costs can seldom be estimated and are not directly chargeable to home ownership.

Thus the annual cost of ownership on a newly built debt free home costing $12,000. may be itemized in this manner:

Real estate taxes @ 2½%	$300.00
Assessment for paving	50.00
Repairs and maintenance @ 1½%	180.00
Fire and tornado insurance @ ½%	60.00
	$590.00

On a monthly basis this is $49.16 from the current income. If obsolescence and interest on the investment are computed and added to this amount the figure is:

Amount from current income	$590.00
Obsolescence @ ½%	60.00
Interest on $12,000. @2½%	300.00
	$950.00

Or the amount monthly is $79.16.

It is a mistake to buy beyond the ability to pay, for the usual result of this is the loss of the home or a most discouraging struggle to hold it. From the experiences of savings and loan associations and mortgage companies which finance the purchase of homes it has been found that, in general, purchases in which the value of a house and lot lies between 1⅔ and 2½ times the assured annual income of the family purchasing it, may be considered to be safe investments. "Double the annual income" is suggested as a safe rule. In most cases this allows for a margin of safety for the family. It was found by these agencies, that purchases in which the expenditures for the houses greatly exceeded double the annual income commonly resulted in failure on the part of the family to finish its project. Of course, the amount remaining to be paid in monthly or annual payments and the length of time for which payments must be made, and the other commitments which the family has, greatly affect the probability of carrying the project to completion as well as the satisfaction in family life during the period. Another rule applies to the value of the property: the value of the lot should comprise one-fifth of the total of the property. Neither an expensive house on a cheap lot nor an inexpensive one on a valuable lot is a good investment.

On incomes of less than $3,000 it is, as a rule, unwise to buy a home costing more than one and two-thirds times the annual income. On high incomes more than two and a half times the income may be spent for this purpose if taste and desire prompt this action, but for incomes of over $10,000 the average purchase price is often about the same as the yearly income. When there is every prospect that the income will increase, the general rule is often ignored.

Judging the value of a house is difficult. The real prices of houses are not as readily known as the prices of other articles, and the technique of buying and selling smacks of old horse-trading methods. Expert opinion should be sought from the banker, the broker, and the builder. Compare the price with the asking prices of similar houses offered for sale and with current rentals of such houses. Thus a purchase price should range but little beyond 100 to 120 times the monthly rental value of the property.

The effect of shortages and a period of inflation on the selling price of houses and the status of home ownership is shown by an analysis of the situation in the United States in the period between 1940 and 1944. Then there was a rapid and continuous shift from tenancy to home ownership. The proportion of homeowners increased 15 per cent over the beginning of the period. Forced purchases probably constituted a substantial part of these transactions. Serious housing shortages growing out of wartime migrations and increased employment and incomes combined with the traditional urge for home ownership led to an extremely active sales market. Competitive bidding by prospective owners caused sharply advancing prices of homes.

How much should a family be able to pay down as a begining equity? Usually it is desirable to possess, free from obligation, at least one-fifth, or 20 per cent, of the value of the house and lot in cash. Although arrangements are often made for a purchase with less equity, a larger cash payment means that less interest is paid in the long run and the loan is more apt to be repaid. From the banker's standpoint, the down payment or beginning equity should be sufficient to make the loan safe; that is, it should be at least sufficient to cover all expenses, including foreclosure, alterations, repairs, and sale, in case payments are not completed. If possible the term of the loan should run no longer than 15 to 20 years.

When a house is being bought there are certain fees required to initiate the purchase. These charges are for title examination and proof, appraisal of the property, legal tasks of drawing up the deed and registering it, and other services including arranging a loan where necessary. A prospective purchaser should allow between two and four per cent of the purchase price for these costs.

If it is not possible to make a complete payment for a house, costs in regard to financing and paying off the loan are involved. Any loan for a month or longer involves the payment of interest. On a straight mortgage this is simple interest and can be figured readily on the amount of the loan for the length of time loaned. The total amount paid is then the interest and the amount of the principal.

An amortized loan presents a more complicated picture. This is also simple interest, but the interest is computed on a principal which is decreased as the payments are made. Because computation is long and involved, finance agencies usually depend on tables worked out on the basis of $1,000 loans at common rates of interest to be retired in a given length of time.

When the interest is 6 per cent, a loan can be retired in a little less than 12 years by monthly payments of 1 per cent of the original loan or 12 per cent annually as shown on pages 693 and 694. However, other rates of interest are charged and it is more accurate to use the exact payments required to amortize a loan in the term of years selected, as:

TERM	MONTHLY PAYMENT FOR $1000. AT			
	4%	4½%	5%	5½%
20 years	$ 6.06	6.33	6.60	6.88
15 years	7.40	7.65	7.91	8.18
12 years	8.76	9.01	9.25	9.51
10 years	10.13	10.37	10.61	10.86
8 years	12.19	12.43	12.66	12.90
5 years	18.42	18.65	18.88	19.11

If the $12,000 house mentioned previously had been financed for about two-thirds of its cost for 15 years at 5% interest, the financing costs would have been as follows:

Cost of house and lot	$12,000.00
Amount of down payment, 33½% of cost	4,000.00
Amount of loan	8,000.00
Amortization and interest per month	
$7.91 × 8(thousand)	$63.28
or for the year	$759.36

Yearly then, the tangible costs are

$759.36	Amortization and interest
590.00	Other costs as previously computed
$1349.36	Annually or $112.44 monthly.

The total cost of financing the house by this means involves finding the total amount of interest paid and the amount paid, as:

Yearly payments		$759.36
No. of years paid		15
Total amount paid		$11,390.40
Total amount paid	$11,390.40	
Amount of loan	8,000.00	
Amount of interest paid	$ 3,390.40	
Total cost to retire the loan:		
Down payment		$ 4,000.00
Loan		8,000.00
Interest		3,390.40
Total		$15,390.40

There has been a tendency to include in the mortgage loan on new property items other than the real estate debt. In some cases the mortgage includes such items as ranges, refrigerators, and washers, payment for which has formerly been concentrated in two or three years.

The amount which a family can afford to pay annually for its shelter runs between one-eighth and one-third of the family income, depending upon the special circumstances in each case.

If a family has been paying in the neighborhood of one-sixth of its income for rent, it may be able to devote one-fourth or more to buying and maintaining a house, for the amount thus used may include both rent and savings. After the first payment is made a family should plan to devote a certain amount of current savings toward paying off the loan at regular intervals. The whole problem appears to center around certain definite factors, namely: the relation of the value of the house and lot to the income; the amount of the present savings which can be used as a down payment; and the sum of the present annual rent and annual savings which can be used for the expenses of home ownership including amortization and interest.[1] As has been previously stated, the value of an owned home should be in keeping with the income which supports it. Usually this value lies between 1⅔ to 2½ times the assured annual income. If a family must secure a loan to buy a home, a beginning equity of at least 20 per cent of the value of the house and lot is desirable as the burden of financing charges is too great with smaller equity.

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[1] See Appendix for table showing how a $1,000 loan at 6 per cent interest is retired in 11 years and 7 months by monthly payments of $10 each.

In some cases the problem of purchasing a home comes at the same time as that of purchasing the furnishings for the home. Or, the family may be concerned as to whether their accumulated furnishings are suitable for a new home. In either case, consideration should be given to the investment in furnishings.

How may a desirable relationship between family income and expenditures for, or investment in, home furnishings be determined? When shall the investment be made? These are questions with which many people are concerned. Usually the amount or adequacy of the family income will be found to follow a cycle, parallel to the family cycle. It is usually more or less limited in the early wage-earning years, then develops to a relatively high point or plateau, after which it normally declines. The peak or the height of the earnings is usually later than the peak of investment in household furnishings. Because of this difference in interval between needs and receipts, it has become customary in America to provide for the purchase of home furnishings either through savings made in the years prior to the purchase, or by obligating the family to make payments for the furniture in the years after its purchase. The hazards of furnishing homes on the deferred payment plan have been colorfully portrayed by Josephine Lawrence in the book *If I Have Four Apples.* Serious consideration of the problem is advised.

During periods of prosperity usually more investment is made in household furnishings, and unless great reduction is made in the family income, the furnishings of the more prosperous period are retained despite reverses. Again, the nature of household furnishings is such that they are not immediately consumed as are many other commodities, hence they may be retained for a long time and perhaps be considered as a part of the family capital. It is for these reasons that the recommendations for the home furnishings budget are elastic rather than specific.

For the total investment or cost of house furnishings on small and moderate incomes, the recommendation is frequently made that approximately 25 per cent of the cost of the house be invested in furnishings. If the family is housed in a home having a value of twice the annual income, the cost of furnishings would then stand in the relation of 50 per cent of the annual income. It is the problem of the individual family to decide if this recommended amount is sufficient for it, or whether a larger or smaller amount is desirable. It would seem fitting for a family to plan first to house itself either in rented or owned homes in the proper relationship to its income and then buy furnishings in relation to the house. In fact, if furnishings are to be purchased on the installment basis at the time a house is purchased, it might be advisable to consider including their cost in the plan for financing home ownership. However, furnishings are usually purchased before home ownership is attempted, and may have been wisely chosen with the thought of continuing their use through all of the family cycle.

If a family desires to follow the recommendation of limiting the furnishing budget to 25 per cent of the cost of the house, suggestions as to the proportionate dispersion of this sum among the various rooms may well be considered. The living room is given the most important place in this dispersion, with the dining room and bedrooms following in importance. Owing to the fact that kitchen requirements vary radically in different homes, estimates on this room are often omitted. The suggestion has been made that 15 per cent of the total sum available for furnishings be arbitrarily budgeted for the kitchen, although this may be low if major household appliances such as ranges or refrigerators are purchased. The top table on page 261 indicates the recommended percentages for various rooms in the case of several different houses.

Approaching the matter as to the amount of money which might well be devoted to each room on total budgets for furnishings varying from $450 to $1,000, $1,800, $3,000, and $5,000, respectively, the tabulation shown in the bottom table on this page has been prepared.

PROPORTIONAL ROOM PERCENTAGES FOR ROOMS OTHER THAN THE KITCHEN[1]

Room	2-Room Home	3-Room Home	4-Room Home	5-Room Home	6-Room Home	7-Room Home
Living room	67	45	40	32	30	28
Master bedroom	33	25	20	21	17	16
Dining room	....	22	20	19	17	16
Hall	....	8	6	6	6	5
Guest room	....	....	14	14	11	10
Child's room					10	9
Additional bedroom	....	....	....	....	....	8
Sun porch or nursery	....	....	....	8	9	8
Kitchen (15% of whole)	....	....	....	....	....	....
Total	100	100	100	100	100	100

HOME FURNISHINGS BUDGETS[2]

Room	Budget of $450	Budget of $1000	Budget of $1800	Budget of $3000	Budget of $5000
Living room	$122.40	$272.00	$489.60	$816.00	$1360.00
Master bedroom	80.32	178.50	321.30	535.50	892.50
Dining room	72.68	163.50	290.70	484.50	807.50
Hall or sun porch	22.95	51.00	91.80	153.00	255.00
Child's or guest room	53.55	119.00	214.20	357.00	595.00
Kitchen (15% of whole)	67.50	150.00	270.00	450.00	750.00

It is probable that additional rooms, such as library, sun parlor, and nursery, are included in those cases where the larger budgets are provided. Naturally in such cases, the money available would be divided as wisely as possible among all the rooms to be furnished.

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[1] *Furniture, Its Selection and Use,* p. 6. National Committee on Wood Utilization, U. S. Department of Commerce, Washington, D. C.

[2] Adapted from a similar table in *Furniture, Its Selection and Use.* National Committee on Wood Utilization, U. S. Department of Commerce, Washington, D. C.

In five suggested budgets for living rooms presented in the reference cited above, from 25 to 40 per cent of the allowance for the room is assigned to two upholstered pieces, the rest being used for other furniture, floor coverings, and accessories. The dining room budgets assign 65 to 70 per cent of the allowance for the room to dining room furniture and the balance to floor coverings, draperies, and accessories. The budget for this room does not include silverware, dishes, and linen, so if these items must be included in the budget, a different allocation would need to be made. Similarly, in the five bedroom budgets an allowance of 65 to 70 per cent is made for furniture, the rest being devoted to the other things needed in a bedroom.

These recommendations are to be regarded as suggestive and tentative only. However, wide deviation from these tentative standards should lead to thoughtful consideration of the values sought and to a critical analysis of the proposed dispersion in the light of the whole situation.

Only a few studies have been made that indicate specifically the trend of family investment in house furnishings. Moss, in a study of 25 professional families, concluded that the expenditure of a family for furnishings and equipment bears little close relation to the size of its income. Rather the expenditures seem to be controlled by family interests, personal taste, and permanence of the location, and tend to be augmented often by gifts of considerable value. However, in this professional group of families to whom furnishings were important, the investment in furnishings for all families was found to be fairly close to 50 per cent of the value of the house and lot.[1] Randle studied furnishings and equipment of 16 Kansas "master farm homemakers" in farm homes having incomes from $1,500 to $6,500. She found the average total cost of furnishings and equipment to be $2,416.87. The dispersion is shown by the following list: living room, $860.05, 35 per cent of the total; dining room, $350.64, 18.6 per cent; bedrooms, $492.15, 20.4 per cent; kitchen, $366.82, 15.1 per cent; bathroom, $12.03, 0.5 per cent; laundry, $84.78, 3.5 per cent; porch, $10.55, 0.4 per cent; cleaning equipment, $30.40, 1.2 per cent; basement, $10.83, 0.4 per cent; and sun parlor, $65.39, 2.7 per cent.[1]

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[1] Mary Rose Moss, *Relation Between Expenditures for Household Furnishings and Equipment and the Family Income*. Unpublished Master's thesis, 1931, Kansas State College.

Bowman, as a result of a survey made in Goshen County, Wyoming, recommends that a young couple establishing a home should have available for home furnishings at least $442.50.[2] However, the amount depends upon the scale of income and the standard of living contemplated by the family concerned. Andrews suggests that a reasonable amount for a young couple to have accumulated in cash and furnishings would be an equivalent of at least one-fourth to one-half the annual income on which they expect to live.[3]-Thus a couple should have accumulated $375 to $750 for home furnishings before marriage if they are to live on a $1,500 income; $500 to $1,000 on a $2,000 income.

When the initial investment in household furnishings has been planned and made to the satisfaction of the family members, they should not regard the matter as settled "once and for all." Conditions may arise that necessitate making additions to the furnishings. Then there is the problem of maintenance. Household goods eventually wear out and must be replaced or repaired. Sometimes changed standards of living necessitate replacing some or all of the furnishings. Perhaps the first expenditure was not quite complete. At any rate, expenses for home furnishings occur annually. If a family is living in a well-established home there is much less expense for house furnishings and equipment than is necessary if the family is gradually accumulating the essentials for a comfortable living.

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[1] Elizabeth Randle, *Analysis of Work Sheets of Master Farm Homemakers in Kansas and a Study of Relationships Between Cost of Household Furnishings and Equipment and Average Net Income.* Unpublished Master's thesis, 1932, Kansas State College.

[2] A. E. Bowman, *An Economic Survey of Goshen County, Wyoming.* Wyoming Extension Service Circular 25, 1930.

[3] Benjamin R. Andrews, *Economics of the Household,* revised edition. p. 169. The Macmillan Co., New York, 1935.

The amounts actually spent by farm families for items of home improvement are indicated in the table on this page.

AVERAGE AMOUNTS REPORTED, 1934–1940 (802 ANNUAL RECORDS FOR 346 KANSAS FARM FAMILIES)[1]

Items	Average Value Per Annual Record
Refrigerators	$89
Stoves	50
Laundry equipment	36
Minor repairs	36
Furniture	30
Cabinets	26
Floor coverings	19
Curtains and textiles	11
Paint and wallpaper	10
Small equipment	7
Yard improvement	4
Dishes	3
Unclassified items	14

Suggested Activities

1. Mr. Smith is an electrician with an income of $3500.00. He and his wife have been married for seven years and have two children, Bobby, 5 years of age, and Jane, 2. They have furnished their present rented home and have a savings account of $1800. His prospects for a raise in salary are good. They want to buy a home but because of an anticipated minor operation for the mother they believe that they should not reduce their savings below $200 at the present. They find three advertisements in their local paper which interest them.

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[1] Myrtle A. Gunselman, *Farm Incomes and Living Costs for Certain Kansas Families.* Excerpt Table 23, p. 26, Bulletin 327. Kansas State College, Agricultural Experiment Station. 1945.

- (a) WESTWOOD—Splendid location, 1517 W. 50th St.; 3 bedrooms, sleeping porch; near school, car, bus; reduced to $7250, terms to suit. WE 7163.
- (b) CHARLOTTE, near 57th—Large bungalow, 50-foot lot; spacious living room, 3 bedrooms; now $6500; rented at present $55.00 monthly. HI 1461.
- (c) REAL Bungalow—Long living room, kitchen built-ins, beautiful oak finish, floors like new, very latest decorations, breakfast room, 2-car garage; located in one of best blocks; near car and bus; only $5500. Owner, VI 1202.

Upon investigation they find that the first two houses meet their needs satisfactorily without alteration. The third house, they find, has only two bedrooms and they would need to add a third costing about $800 in a short time. Figure the annual expenses of home ownership and costs of financing for each of these houses and decide in the light of their prospects which one you think they should buy.

2. Mr. Brown, a mechanic earning about $2,200 per year, has been married ten years. He and his wife have three children, James, eight; Ann, five; and Thomas, three. They have a savings account of $600 and are looking for a house which they hope to buy. They find these advertised homes for sale:
   - (a) 3112 CENTRAL—7 rooms, fine home, income; splendid location; $4,500, worth $1,000 more; terms. Lucas. Westport 8300.
   - (b) ACRES, 2—With fairly good modern home; chicken house; 2-car basement garage; shrubbery and some fruit; $5,300. VI 9494.
   - (c) TERRACE, 4710—An excellent bungalow; improvements; 5 rooms, sleeping porch; garage; $6,000. Wm. E. Lyons, VI 0607.

   Considering their prospects and responsibilities which one do you advise them to take?
3. Do you find it necessary for the families in the preceding questions to seek a loan to buy their houses? If so, what is the cost of financing it in each case?

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Problem 5. WHAT FINANCING AGENCIES MAY THE PROSPECTIVE HOME BUYER USE?

Broadly speaking there are two ways to buy a house: one is to pay for it outright in cash; the other is to make a down payment and to cover the balance with a mortgage which will be paid out of future income. The first method is usually the best, but in attaining home ownership many American families find it necessary to employ the latter means. A knowledge of the institutions and agencies which make loans on real estate and something of their practices is important to those financing their homes through a loan.

A source of funds for home buyers who must borrow to finance their home-buying project is life insurance companies. The loans from life insurance companies are placed through local agents, banks, trust companies, mortgage companies, and individuals trained in the work. Applications are received only in connection with properties in developed sections where values are stabilized. The applicant must furnish data on location, size, and contour of the lot, the condition of the building, materials of which it is constructed, and its heating, lighting and plumbing systems. The appraisal is always a conservative one, the loan value often being lower than the contracted buying price. As a result of their appraisal methods, those conservative companies loan 60 per cent of their appraised value, but seldom does this sum amount to more that 50 to 55 per cent of the cost of property to the purchaser. The loan is made on a mortgage basis. Insurance company loans run for periods as long as fifteen years. The interest rate is that prevailing in the locality where the loan is made. The method of retiring the loan varies with the company. In addition, some companies require the borrower to take out an insurance policy which is large enough to protect the family's equity in its home in case of the death of the wage earner. In no case does it recommend borrowing on the policy the family already has to make the down payment or any part of the loan.

The savings bank is a lending agency which often lends somewhat more than does the insurance company to home buyers. Application for mortgage loans are made to the real estate department or to some officer appointed to pass on such applications. Appraisal is usually made through personal inspection and usually the valuation reached is not greatly below the market value. Savings banks are generally restricted by state law to a maximum loan of 50 per cent of the value of the property. Savings bank loans are frequently made for short terms—one, three, and five years—and the full amount is repayable at the end of the term. However, an increasing number of banks make long-term loans.

Trust companies have both savings deposits and trust funds available for real-estate loans. Their lending policies and methods are similar to those of savings banks.

National banks and many commercial banks are prevented from lending money on real estate by restrictive federal and state laws under which they operate. They may, however, invest as much as one-half of their savings deposits in realty loans for periods up to five years.

Mortgage companies are another source to which one desiring a loan on real estate may turn. There are two classes of mortgage companies. those lending on first, or senior mortgages, and those lending on second, or junior mortgages. The practice of making a second mortgage on real estate, however, is fast being abandoned. These organizations are generally not so limited by legal restrictions as are trust companies, insurance companies, and banks. Companies selling mortgages, the repayment of which they guarantee, and those whose investments are eligible for purchase by savings banks and trustees are the more conservative of this class of lenders. These do not usually lend in excess of 50 per cent of their appraisal of the property. Other companies make loans larger than 60 per cent of the sale price but may charge a commission or a higher rate of interest than that borne by more conservative first-mortgage lenders. Loans of mortgage companies are made for both short and long terms and on the amortized or straight basis.

Another group of lenders is made up of private investors. Their methods of lending are entirely unstandardized, and they are likely to advance funds more freely than institutions do, especially if they have opportunity to obtain unusually favorable returns. There is less assurance of renewal of a long loan from a private investor than there is from institutions, as a change in plans or circumstances of the lender, or his death, may make such a renewal impossible.

The savings and loan associations are common lending agencies and go by various names, but they are created for the promotion of thrift and home ownership. They provide a method of saving and then lend the funds for the purchase and construction of homes. Lending policies and methods differ among the associations. Applications for loans frequently are received only from members, but in many associations the home buyer may easily enter into membership and apply for a loan at once. The loan application forms usually request information not only about the site and the existing or proposed building, but also concerning the health, occupation, and income of the prospective borrower. Personal responsibility is an element often given much weight, especially if the loan applied for is a considerable portion of the purchase price. The application may be examined by the board of directors, and the property appraised and the title examined before the loan is made. Most associations appraise property at the full market value and are willing to lend on the basis of two-thirds or more of their appraisement. Other associations are more conservative, limiting the loan to one-half the appraised market value.

Association loans are made for periods as long as twelve or more years. The interest rate is often slightly higher than that asked by other financing agencies and a premium or commission is sometimes charged. The associations claim justification of these higher charges because their loans are made for long periods and the borrower is saved the expense of renewals. Also since their loans represent two-thirds or more of property value, they perform a greater service than do institutions lending not more than half the amount of their appraisement. Borrowers seeking construction loans often find it to their advantage to borrow from savings and loan associations because of the advice which specialists in the organization can give in connection with the building project.

The land contract method is a financing plan most commonly used by those home buyers who can pay only 10 to 15 per cent of the purchase price. This method is used by those whose property and whose personal prospects do not measure up to the standards set by the FHA described latter. This instrument, the land contract, is simply an agreement between the buyer and the seller whereby the buyer makes a small payment and agrees to pay the balance in installments. The seller does not convey the legal ownership of the property to the buyer but agrees to do so when a certain percentage of the purchase price has been paid. At that time the buyer refinances the loan, either by a mortgage to the seller or to some other lender. Before entering upon such an agreement, the buyer should be extremely careful that a clear title can be given by the seller; otherwise, he may sustain considerable loss.

Regardless of what lending agency supplies the money for the home ownership loan, it is secured by a mortgage on the real estate. The mortgage has ceased to be a subject for melodrama and has become an instrument to facilitate enjoyment of ownership while paying for the property. Two kinds of mortgages are now commonly used: the straight mortgage and the amortized mortgage.

A straight mortgage requires the entire amount of the mortgage to be paid on a given date, usually a short term of from one to five years from the date of contract. Usually the lender is expected to renew the mortgage for a similar period after requiring a payment sufficient to cover depreciation. He has a legal right, however, to demand full payment and refuse renewal. In any case, there is no assurance as to the size of payment he will require, and the borrower finds difficulty in estimating how much of his income to set aside to meet the demand. Such a mortgage is more costly at 5 per cent interest than a monthly amortized mortgage at 7 per cent because periodic payments accumulated in a savings account to meet the date of maturity of the mortgage will not earn as much interest as the same payments would return if used to reduce the principal of the mortgage. It has the further weakness of inviting the borrower to make commitments which he does not expect to keep and then depend on the lender not to require him to keep them. In addition, there are always extra costs connected with each new mortgage.

An amortized mortgage calls for paying the principal of the loan in stated monthly, quarterly, or semiannual payments for a period of years, usually 5 to 25. With each of these periodic payments, the interest is paid and a portion of the principal on the mortgage is reduced so that at the end of a specified period the total is paid. The payments during the first few years, when the larger part of the principal is still outstanding, obviously will mainly be interest, while during the last years, when much of the principal has been paid off, the same amount will largely be payment on principal. Some of these mortgages permit additional payments to be made and also allow for omitting as many payments as have been made in advance. Although the cost to the borrower of an amortized mortgage is usually less than straight mortgage, it usually calls for the same monthly payments when the house is old as when it was new.

In 1932 and subsequent years, as a depression measure, the federal government enacted a series of laws designed to assist homeowners in the financing of their properties. The first measure, the Federal Home Loan Bank Act, created the Home Owners Loan Corporation to relieve mortgage distress by financing the home mortgage indebtedness of individuals about to lose their homes. The National Housing Act, approved in 1934, created the Federal Housing Administration, known as the FHA, to enable families who wish to have their own new single family house to borrow on an amortized mortgage approximately 80 per cent on the cost of an approved house having a value of not over $20,000. Approved properties having a value up to $6,000 can have a loan as much as 90 per cent of the value. Between $6,000 and $10,000 a loan of 90 per cent can be made on the first $6,000 and 80 per cent above this amount. Above $10,000 the 80 per cent of the value is the maximum amount that can be loaned. The monthly payments cover interest on the loan, taxes, and payments on the principal which reduce the debt in 15 to 20 years. The interest on the unpaid balance is 4½ per cent plus a half of ½ per cent of the unpaid balance which is to go into an insurance policy to safeguard lenders against loss due to foreclosures on some properties. Thus the cost of the loan is the equivalent of 5 per cent interest. When money is loaned for modernization rather than for new construction, the interest rate is higher.

The money loaned on an FHA mortgage is not from federal funds but from any of the lending agencies mentioned in this problem. Thus, the loan money comes through familar channels but the property is appraised, approved, and insured by the FHA; thus when a mortgage loan is insured through the FHA the lending policies of any of the institutions described may be altered.

Lending institutions operate under a greater degree of governmental supervision, both state and national, than almost any other type of private business. If an institution is a member of the Federal Reserve System or the Home Loan Bank System or if it insures its deposits with a federal agency it is subject to further examinations and restrictions of its policies and activities. Any type of institution may insure its mortgages with the FHA, but if it chooses to do so the terms on which it can make loans are again affected. Large institutions frequently can operate at a lower cost than small ones.

If the borrower is able to invest only a small proportion in cash at the outset, his choice of lenders is more or less limited. In many states, savings and loan associations have no limit on the amount they can lend in relation to the total value, even without FHA insurance. Federal Savings and Loan Associations can lend up to 75 or 80 per cent of the value without FHA insurance.

In financing the purchase of a house, all the possibilities for securing a loan should be canvassed. The source which will provide the most convenient terms for repayment at the most reasonable cost should be selected. In planning to finance a purchase, it must be remembered that the larger the down payment that can be made, the better are the terms that should be secured in financing the balance.

Suggested Activities

1. What financing agencies are represented in your local community? Which of these agencies lend only on first-mortgage loans? Which will lend on second-mortgage loans also? Will any of them lend on third mortgages? What rates of interest are charged in each case?
2. What is the function of the life insurance company in lending money for financing home ownership? Is borrowing on one's life insurance policy to finance home ownership a wise procedure? Produce figures to substantiate your findings.
3. What restrictive laws does your state have concerning money lent on real estate by state, national, or commercial banks?
4. When have you known of real estate being sold by the land contract method? Find an advertisement indicating that this method may be used?

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Problem 6. HOW SHALL THE COST OF BUILDING A HOME BE ESTIMATED?

Having decided to assume home ownership, a family has the choice of several methods of purchasing the house. A new house just completed may be bought from a real estate firm or other company carrying on building operations, or from an individual owner. A used house may be bought and plans be made to live in it, or to alter and repair it to meet the family's needs. Or, land may be bought and a house built on it according to the desires of the family, the construction being done by a contractor or by the day's work. Of these various ways, perhaps building the home is most earnestly desired and also least frequently used by the average family. Each of these methods of obtaining a house, however, has its advantages and disadvantages for the home seeker.

THE HOUSE ALREADY BUILT—NEW OR USED

Advantages

1. Its appearance and general layout can be seen and judged.
2. Comparisons as to layout and price can be made with other houses.
3. The price is fixed.
4. Its marketability is known.

Disadvantages
1. It may be a compromise with the owner's idea of a house.
2. Tempting alterations may raise the cost.
3. There may be hidden defects.

BUILDING A HOUSE

Advantages
1. It is possible to obtain a design closely related to family desire.
2. Opportunity is presented to get sound materials and workmanship.
3. The experience of building is interesting.

Disadvantages
1. Plenty of time is required to design and build.
2. It is difficult to predetermine the final cost.
3. Time and patience is required to deal with the large number of tradesmen.

When a family is convinced that building a house is the most satisfactory way to obtain a home, the prospective owner is confronted with several perplexing problems. Members of the family have perhaps dreamed over their ideas of floor plans for years and have worked out sketches of arrangements, and collected pictures presenting attractive features. They may even have gone so far as to estimate the cost of certain details greatly desired. Usually they will have a total cost price which they plan not to exceed. However, they are still at sea as to how big a house and what quality of house they can expect to obtain for the established cost price. At this stage the nearest that anyone can arrive at a cost is an approximation.

The first step in approximating the cost of a contemplated house is to ascertain the cost of houses similar in plan and structure recently built in the same locality. There are three much used methods of determining the approximate cost of building a house:

1. *Cost per square foot.* The area of the floor space is computed on the basis of the exterior measurements. If the total cost of the house is divided by the square feet of floor area the cost per square foot is determined. Comparisons on this basis must,

of course, be made of houses having the same number of floors and similar layouts.

2. *Cost per cubic foot.* The cost per cubic foot is ascertained by using the following simple formula: (Floor area × height to the eaves) + (floor area × $\frac{1}{2}$ of height from the eaves to the peak of the roof). Divide the total cost of the house by the figure so secured.

3. *Cost per room.* By this method the total cost of the house is divided by the number of main rooms in it. That is, a house costing $5,000 and having a living room, dining room, kitchen, and two bedrooms would be estimated at $1,000 per room. The cost of the subsidiary rooms such as bathroom, closets, and hall is included in the estimated cost of the main rooms. In order for a comparison to have point, the number and size of the subsidiary rooms in the two plans should be similar, if not identical.

When calculating costs by any of these methods it is well to remember that open porches are considered to cost about one-third as much as the similar content of the finished house, enclosed porches two-thirds as much, and garages about one-half as much.

It is presupposed that with good management in a given season, standards of workmanship, materials, and finish may be duplicated without marked changes in costs. It should be borne in mind, however, that costs of building fluctuate widely from time to time and from locality to locality. Costs are known to rise or decrease rapidly according to trends in the market. Variations in costs from locality to locality are due to the relative availability of material and to differences in wage rates.

Differences in costs of houses in the same locality but made of different materials are shown by the figures on page 276 for the four houses erected for the purpose of research by the Purdue Housing Research Project, which were completed within the first six months of 1936. The costs have been tabulated to compare cubage and square feet costs in regard to the different materials used in the construction.

A substantial reduction of costs of building can be made by choosing plans which eliminate nonessential or waste space.

This amounts to an actual reduction of size through elimination of halls and the combination of the uses made of certain rooms. In some cases an "open plan" may be the result of such combination. Further reductions of cost may be made if the home builder has skill and time to do some of the work himself or to direct semi- or unskilled labor, and if suitable native materials are readily available.

COMPARISON OF COSTS PER CUBIC CONTENT, PER SQUARE FOOT, AND PER CONTRACTOR'S COST OF SIMILAR HOUSES CONSTRUCTED FROM DIFFERENT MATERIALS[1]

Kind of Material Used in the House	Cubic Contents	Cost	Square Feet	Cost	Contractor's Cost
Wood frame and stucco, house and garage	12,712	$0.38	1330	$3.65	$4,852.45
Steel, house and garage	13,850	0.36	1289	3.90	4,992.20
All wood, house and garage	15,790	0.31	1836	3.18	4,986.00
Reinforced concrete, house and garage	16,186	0.309	1882	3.00	4,997.50

Estimates based on cost per square or cubic foot, or cost per room serve only as quick rules of thumb, offering a rough approximation of the cost of a structure. The usefulness of these methods is limited to an approximation of the cost of houses having similar construction and fundamental equipment to those from which the figures were obtained. If conditions vary in any particular, due allowances must be made in formulating the estimate. The general shape of the house, the number of irregularities of line or surface, and the special features included, all influence the cost per unit, whatever the basis of comparison is. The danger in using any of these methods is that the lay person has an optimistic tendency to accept the figure as final, discounting the effect on cost of numerous changes in size and layout. Thus expectations may rise above any possible hope of fulfillment.

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[1] Compiled from Home Information Series, vol. 1, Nos. 10, 11, 13, 14, 15, 23, and 24. Better Homes in America, Purdue University, Lafayette, Indiana, 1936.

Although a rough cost estimate may be computed by one of the methods suggested above, the only way to determine the actual cost is to have working drawings and specifications of the plan prepared by an architect and then secure bids on the plan from contractors.

When planning a house it is well to take plenty of time, even several years, to envision in detail the arrangement and features most desired. Then one should be prepared to make the necessary eliminations to bring the cost within the price limit set. It is advantageous to study the different methods of construction, the materials available, and the manner in which the investment can be made to secure the greatest values. The house plans should be based on the desires and needs of the family, but even so there are choices to be made in materials, floor plans, and methods of construction. Of course, the architect is an invaluable aid in making the final decisions in these matters. Only an extraordinarily well-informed home builder has background to build wisely without the advice of the architect.

The average inexperienced home builder usually plans more lavishly than his available funds would justify. As a result he will either overbuild and thus jeopardize his claim to his property or he will curtail his plans and reduce the cost of the house. Reduction in the cost of the house is the wiser course to take. Attempts to save money by the use of poor materials or unsound construction procedures are not recommended. However, it is unnecessary to use top-grade material for all places. Some of the desired features may be postponed for later building, and discriminating choices may be made among methods of construction and material used. Various means for keeping down original building costs have been suggested. Some but not all of these may be accepted by any one person or family. Individual differences will shape the decisions.

The following features add to convenience or comfort of the home but may be eliminated if necessary:

Complete excavation in basement
Second bathroom
Laundry chute
Fireplace

Postponements:

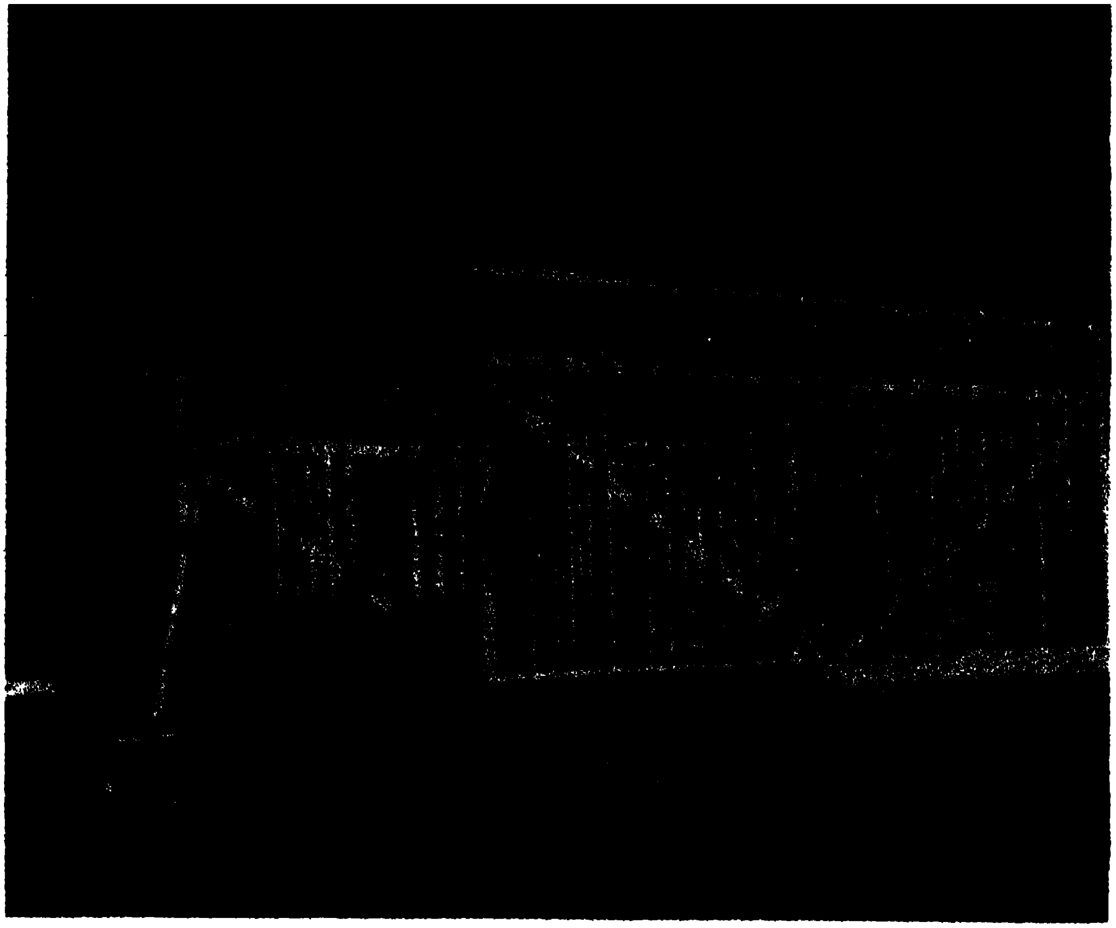
Partitions in the basement
Screening of the porch
Wooden shutters
Wrought iron ornamentation
Porches to be added
Glazing of the porch
Built-in millwork as bookcases, wardrobes, china closets
Finishing of certain rooms as on second floor or in attic
Papering or painting of walls

Choices among different grades of material or methods of construction:

Unless peculiar soil conditions necessitate thick walls, soundly constructed nine-inch foundation walls, city ordinances permitting, may be used instead of thicker walls.
Brick, poured concrete, concrete blocks, and wall bearing tile for foundation work varies in price with the locality. Use the material which has a real price advantage.
Narrow siding is less expensive than wide siding.
Woodwork finishes, stain, and varnish cost less than paint; paint costs less than enamel work.
Soft wood for floors and trim cost less than hard wood.
A two-story house is less expensive than the same number of rooms on one floor.
Rectangular or square houses cost less than irregularly shaped houses.
Ordinary window glass is less costly than plate glass.
Ordinary pressed steel hardware costs less than cast bronze.

These expenditures are recommended even at additional cost:

Fire-resisting shingles in place of wood
Fire stopping in walls
Insulation in regions of severe winters or summers
Heat regulator if type of fuel permits

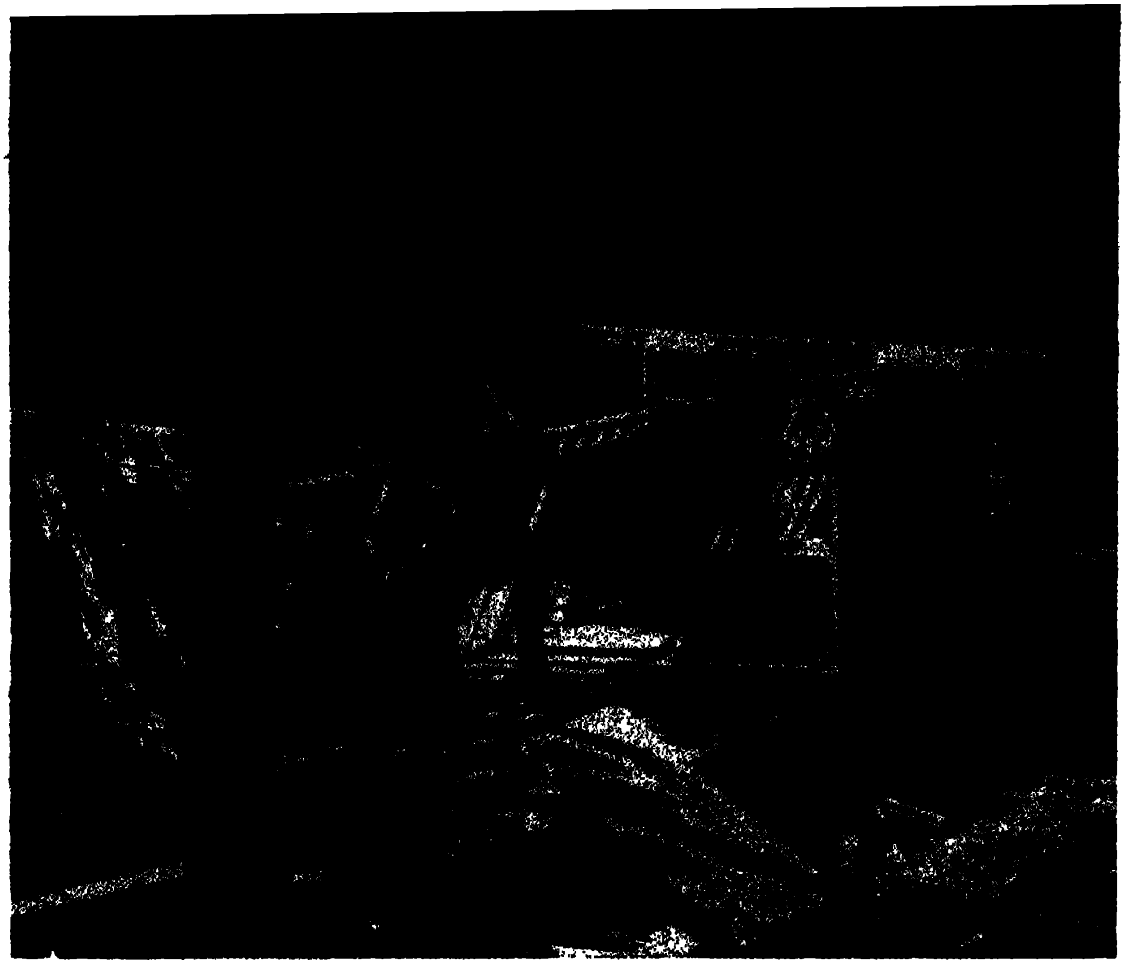


Courtesy Farm Security Administration

This house is being erected by the traditional method of construction on the site.

Decisions concerning any eliminations, postponement of the construction of parts, or substitutions should be based on the advice of a competent architect. The effect on the building of such curtailment must be weighed carefully against the amount saved thereby.

There is a growing recognition by the general public, industry, and labor that housing costs are too high in relation to family incomes and must be substantially reduced if the housing requirements of families are to be met. Thus far we have considered the methods of calculating and reducing costs which are quite obvious and more or less controllable by the home builder. There are some less well understood factors which enter into housing costs. Now we give attention to some of these. Some authorities attribute the causes of high housing costs to a technological lag in the methods for improvement of building houses, to high building material prices, to increases in wages, to restrictive practices in many parts of the building industry, and to regulations governing construction.



Courtesy American Houses, Inc.

The house pictured here and the one on the opposite page are being built of panels prefabricated away from the site. The house goes up quickly when the panels are assembled.

There has been relatively little improvement in the technology of building houses for a great many years. Although certain new materials now mass-produced have been introduced, and economies achieved through better organization of work on large building projects, essentially the same materials and assembly methods are used on the average small house that were used a century ago. Concerning this the National Resources Committee says: [1]

> It is noteworthy that the ultramodern or twentieth-century houses are dominated by the arrangement of interiors for comfortable living and by outlook rather than by external ornamentation. This development is likely to continue at an accelerated pace in the immediate future but will depend for its fullest exploitation and widest enjoyment upon the reduction in the costs

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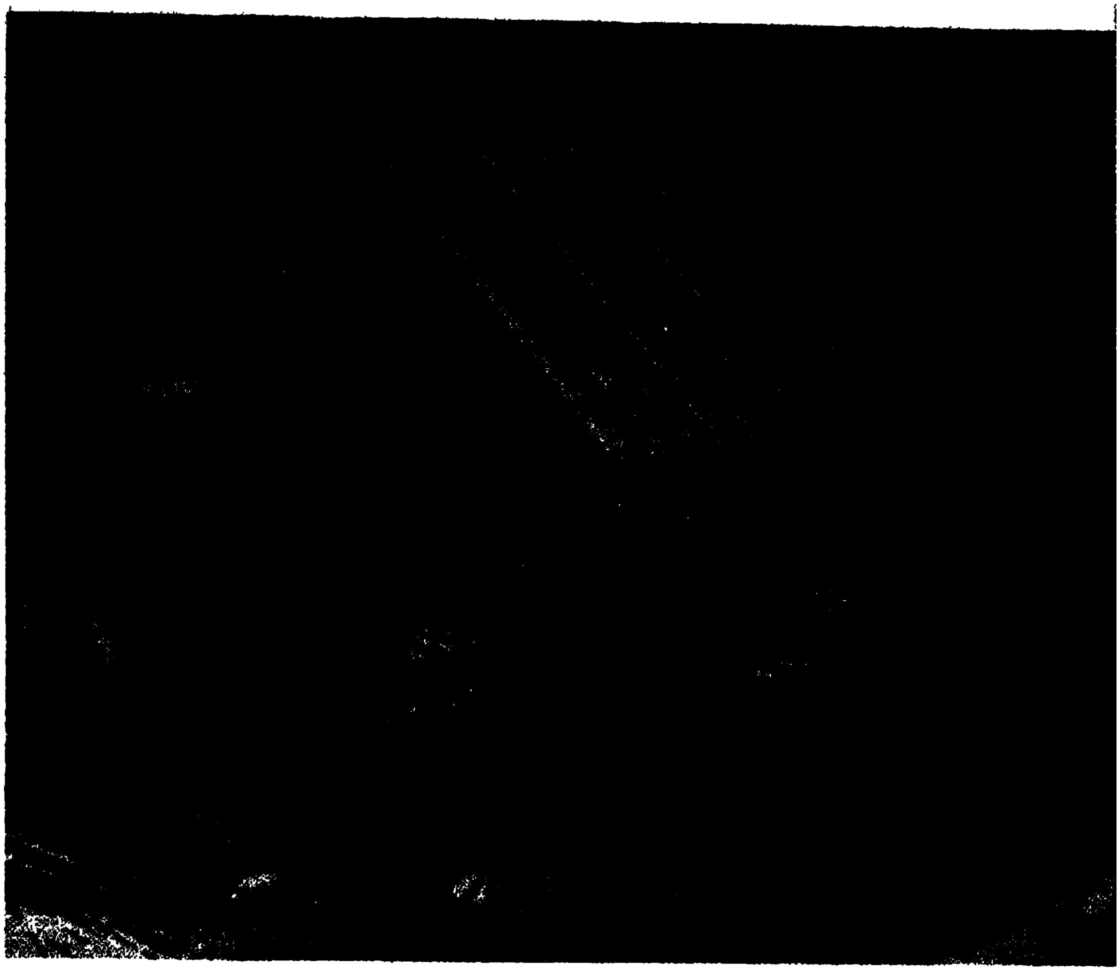
[1] National Resources Committee, *Technological Trends and National Policy.* pp. 371 and 372. U. S. Department of Interior, June, 1937.



Courtesy American Houses, Inc.

This picture shows an outside panel being put in place in the prefabricated house.

of facilities attainable through improved industrial methods and large scale production.

The wide technical advance in production methods which has brought the price of adequate clothing, books, a wholesale variety of foodstuffs, even of radios and automobiles in normal times within the range of nearly all persons still finds "modern" houses (not necessarily new ones) beyond the means of one-third to one-half of the families in the United States.

As can be observed, much of the house building is, today, in the same stage that the garment industry was several decades ago when garments were largely custom-made for individuals according to their personal measurements and with reference to their desires in design. The advent of the ready-made garment has resulted in standardized designs and has greatly reduced the cost of manufacture through mass production. In the house-building industry much manufacturing is still done on the job which might be done more advantageously and at lower cost in a mill or factory.

Prefabrication is among the remedies suggested, then, for bringing about savings in the cost of production. This is a term popularly applied (1) to houses made entirely in a factory and shipped in parts to be assembled on the site; (2) to houses built on an assembly line and set up on the site; and (3) to parts shipped from a factory and installed by the usual construction methods or by site assembly line construction. With the advent of new building materials and methods, shop prefabrication of completed walls and other house parts makes possible the bolting or welding together of whole houses on the site. Variety of design is achieved through different arrangements of the wall areas and roof line. If the cost of houses can be reduced by mass production in the same degree that the cost of garments and automobiles has been reduced, standardization and prefabrication of dwellings would be welcomed by homeowners generally.

A further cause of high building costs has been the tendency for prices of building materials to rise higher than prices of other commodities during periods of prosperity, and to remain high during depressions. Reasons for this seem obscure and the best that can be done is to study the breakdown of the costs of building material into those of manufacture, distribution, transportation, and combined profits which are the elements of the cost. The table on page 283 breaks down not only the cost of materials but the value of the land and its improvements.

Wage rates of building workers have risen more rapidly and higher than in many other types of work. In this trade, however, it is important to recognize that while hourly rates are high, periodic and seasonal unemployment brings the annual earnings of workers to a lower figure than for some other trades. The stabilization of seasonal employment for this trade, however, is a complex matter and involves reorganization of the industry. Benefits from such reorganization are dependent upon the development of more efficient machinery and techniques of building which would permit inside work, perhaps on a mass scale, during bad weather. In addition, the total cost of building due to the cost of labor may be held high because of restrictions in labor practices which require that work be done in a traditional manner, and in some cases without the use of labor-saving equipment. For example, builders complain that labor organizations have resisted such innovations as premixed concrete, paint spray guns, or prefitted doors.

COST OF HOUSE AND LAND[1]

(Each item expressed as per cent of total cost of house and land)

	Price F.O.B. Manufacturer	Cost of Distribution	Cost of Transportation	Price Delivered at Site
1. Cost of materials at site				
Lumber	6.05	4.38	1.42	11.85
Masonry	3.00	.15	.30	3.45
Concrete and mortar	2.54	.46	.33	3.33
Plaster, lath, and wallboard	2.37	1.44	.46	4.27
Insulation	.17	.04	.03	.24
Roofing	.81	.34	.10	1.25
Flooring	1.49	1.22	.24	2.95
Millwork	3.90	3.08	.38	7.36
Paint	1.08	.29	.04	1.41
Finish hardware	.38	.30	.03	.71
Plumbing	3.93	1.20	.35	5.48
Heating	1.03	.30	.09	1.42
Electrical	.51	.42	.05	.98
Miscellaneous	.64	.28	.09	1.00
All materials	27.90	13.90	3.90	45.70

2. Cost of site construction labor	29.50
3. Contractor's and subcontractor's overhead profit	12.30
4. Total cost of house	87.50
5. Value of unimproved land (including profit on land)	7.00
6. Cost of land improvements (including profit on improvements)	5.50
7. Total capital cost	100.00

Closely allied with these costs are those due to regulations governing the construction of houses. The building codes of some cities prevent the use of new materials and new ways of using old materials because they were written at a time when ding materials and methods now old were judged to be most desirable, and because these methods and materials are now supported by entrenched interests that resist change. It would not be desirable to eliminate building codes, for they are society's way of protecting itself against fire, disease, and certain social obstructions. In some cases, where codes are unduly restrictive, and where they thwart sound and worthwhile developments, however, change of the codes seems essential to progress.

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[1] *Housing Costs, Where the Housing Dollar Goes.* National Housing Bulletin 2, p. 45, National Housing Agency, Washington, D. C., Dec., 1944.

Suggestions have been made in regard to certain features in present codes which might well be examined for the purpose of revision to bring about greater economy in the use of materials. Although other deficiencies are extant, some of the faults of building codes follow:

1. Failure to provide any specific method for dealing with new materials and methods of construction.
2. Limiting acceptable materials to a few specified kinds rather than permitting any material that will fulfill the requirements of the particular job involved.
3. Dependence on minimum dimensions rather than safe working stresses.

A fundamental consideration in regard to building costs is the price paid for the lot, and the policy of land control and use. If the price paid for the site is excessive, this expenditure will tend to cramp plans for building. In every city or town, lots in certain parts cost far more than do those in other sections. Not infrequently an area is restricted, the lower level of cost and the size of houses being determined by legal authority. The effect of such restriction is to increase expenditures for building houses. The character of the town or city plan has a direct bearing on the direct and indirect expenditures for a building site. The customary checkerboard plan requires that an undue amount of the available land be used for streets, increasing paving costs and costs for installation of water, gas, and other public utilities. Preference is now being given to other types of city plans such as the deep U and the long block. Savings in the cost of a lot in long blocks with few cross streets may be as much as 15 per cent.

Suggested Activities

1. Ascertain the common local method of approximating building costs. What is the current cost per unit? Determine the approximate cost of building some house plan which you particularly like.
2. What construction features in houses have you known to be postponed successfully?
3. What construction features would you consider important to your housing standard even at a sacrifice to other features?
4. What are the provisions of your local building code? Do the provisions prevent the use of any new material or construction method?
5. Study house plans where certain features are eliminated to reduce cost. Apply the principles of good house planning to determine their value as dwelling places.

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Problem 7. BY WHAT STANDARDS IS THE STRUCTURE OF THE HOUSE JUDGED?

Only a minority of families ever build a home, and the majority of families buy only one house during their lives; therefore the decisions made become most important and mistakes in judgment may be abiding and costly. Although scattered information and facts concerning good and bad construction are available through home-beautifying, architectural, and building-trade magazines and journals, and through books on planning and constructing houses, still the prospective house buyer or builder must search out those bits which specifically apply to his problem.

A handicap which is often encountered by the average person in judging the construction of a house is unfamiliarity with the function of its various principal parts and the nomenclature for them. Information concerning these furnishes a common basis for discussion and clarifies meanings of written descriptions. Study of the diagrammatic scheme on page 287 will acquaint an individual with some of the common parts of a frame house. Definitions of some of these parts follow:

A *bearing wall* is one which supports any vertical load in addition to its own weight.

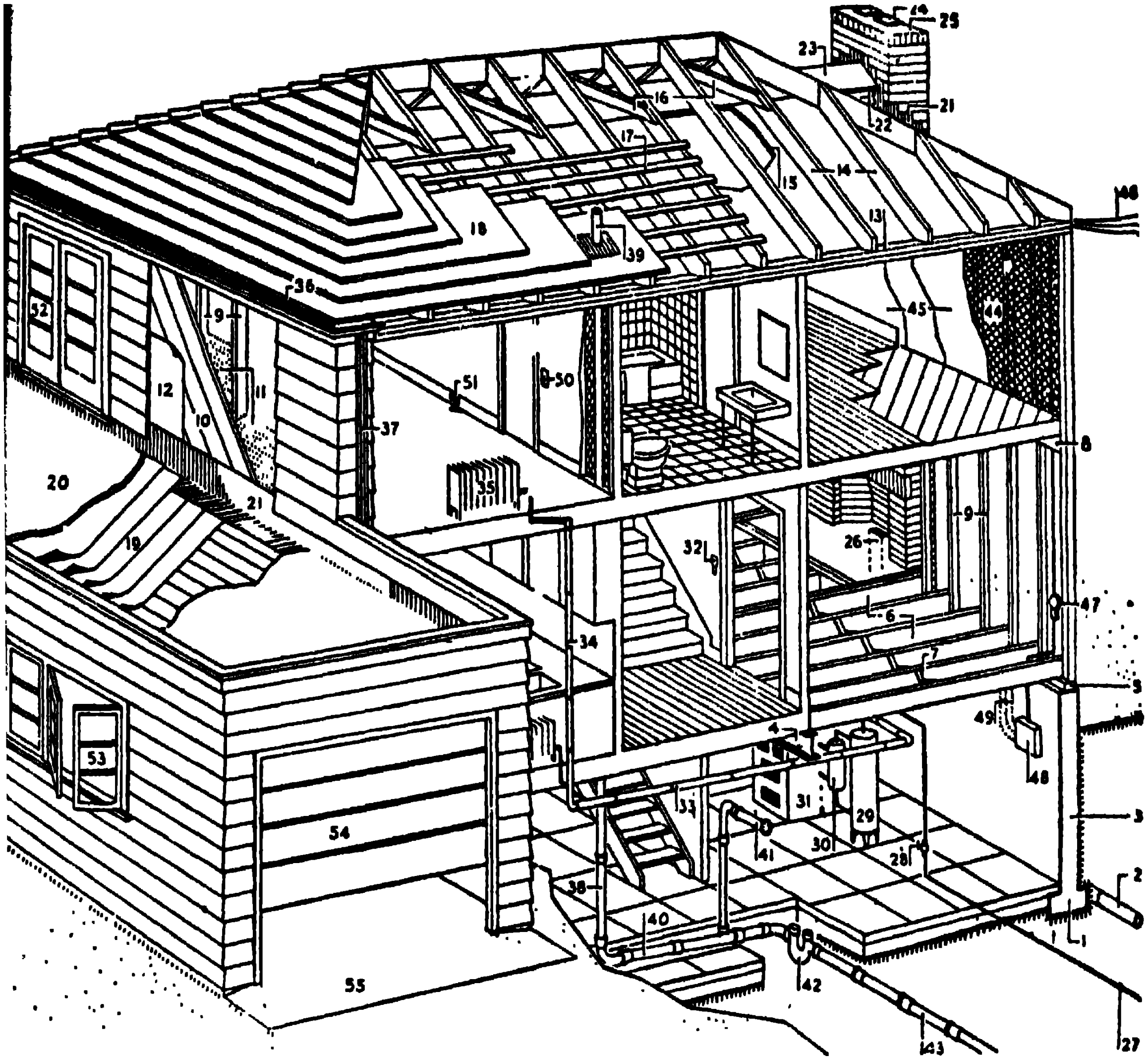
A *foundation wall* is a wall built below the ground level, the curb level, or below the floor line nearest the ground level.

A *partition wall* is any wall in the interior of a building.

A *retaining wall* is one whose chief function is to resist the lateral pressure of earth or a similar material.

The *water table* is a slight projection on the outside of a wall near the ground. It may serve to deflect the water passing over the wall surface so that it will not follow down the foundation wall.

ELEMENTS AND EQUIPMENT OF THE FRAME HOUSE



Courtesy *Better Homes and Gardens* magazine

1. Footing
2. Drain
3. Foundation wall
4. Steel I beam
5. Sill
6. Joists
7. Bridging
8. Ledger board
9. Studs
10. Sheathing
11. Insulation
12. Building paper
13. Plate
14. Rafters
15. Insulation board
16. Collar beams
17. Shingle lath
18. Shingles
19. 5-ply roofing
20. Tar and gravel
21. Flashing
22. Attic vent in cricket for hip roof
23. Cricket, modified to include vent
24. Flue lining
25. Cement wash
26. Ash dump
27. Water supply
28. Shut-off valve
29. Hot-water tank
30. Hot-water generator
31. Boiler
32. Thermostat
33. Steam main
34. Steam riser
35. Radiator
36 Gutter
37. Leader
38. Soil pipe
39. Vent
40. House drain
41. Air inlet
42. House trap
43. House sewer
44. Metal lath
45. 3-coat plaster
46. Electric service
47. Outdoor meter (preferable)
48. Fuse box
49. BX cable
50. Wall switch
51. Convenience outlet
52. French doors
53. Casement sash
54. Overhead garage doors
55. Concrete apron

A *course* is a continuous horizontal layer of brick, stone, or similar material forming part of a wall.

A *sill* is a member at the bottom of a window or door opening.

The *jambs* are the sides of a window or door opening.

The *head* or *cap* is a member at the top of a window or door opening.

A *gable* is the triangular shaped wall, closing the end under a gable roof.

A *wainscot* is a lining placed on the lower three to five feet of inside walls and partitions for protection or decorative effect, also called a *dado.*

Furring consists of a light frame of wood or metal strips applied to a surface to support plaster, stucco, or other surfacing material.

Joists are beams supporting a floor or ceiling. They are usually made of 2 x 8's or 2 x 10's and are spaced about 16 inches more or less apart.

Rafters are beams supporting the roof and running parallel to the slope of the roof.

A *hip rafter* is the member running along the hip or outside turn of the roof.

A *valley rafter* is the member running along the valley or inside turn of the roof.

Studs are vertical members arranged in a row forming the skeleton of frame walls. They are usually 2 x 4's spaced 16 inches apart.

Sheathing is the rough covering applied to the exterior of wood-stud walls to increase the rigidity and heat insulating properties of the wall.

Siding is the finish applied to the exterior of wood-stud walls.

Shed roofs slope in one direction only.

Gable roofs slope in two directions.

Hip roofs slope in four directions.

Gambrel roofs slope in two directions but there is a break in the slope on each side.

Mansard roofs slope in four directions but there is a break in each slope.

A *dormer window* is a vertical window in a sloping roof.

A *soffit* is the finished underside of the subordinate parts and members of a building, such as staircases, archways, cornices, and the like.

In addition to being conversant with the various construction elements in the building it is well to understand something of the manner of developing the structure. Although a little knowledge may be a dangerous thing, no knowledge is crippling. A house of permanent structure which traditionally has a life of 60 years begins with a good foundation and often with an excavation for a basement.

Concrete has largely replaced stone and brick for foundation walls. It is usually cheaper than brick or stone masonry, and more substantial and water-tight than either; however, a brick foundation wall is known to stand uneven settlement without serious cracking better than concrete. The bearing wall above the ground may not be concrete, as there is little advantage in cost over brickwork, and unless special attention is given to the surface treatment of concrete, it is unattractive.

Foundation or exterior basement walls are usually no less than eight inches thick. They set on a wall footing which extends into the earth about 12 inches and forms a base and anchor for bearing the weight of the house. Drainage is often provided on the outside to prevent seepage of moisture into the basement at that point.

This drainage system may consist simply of a backfilling of loose rock to collect water which would otherwise come against the wall. A line of pipe with open joints is commonly installed next to the footings to carry the water away. The house is fastened to the foundation wall with expansion bolts sunk into the masonry and extending into a wooden sill.

Walls and partitions whose structural elements are made of wood are classed as frame construction. These structural elements called studs are arranged in a row. Their lower ends rest on a long horizontal member called a bottom plate or sole plate, and their tops are capped with another plate called a top plate. The spacing of the studs is usually 16 inches so that they will support, without waste, wood lath with the standard length of four feet, and accommodate such accessories as heating ducts, bath insulation, and other items. Double studs are provided at the sides of all openings. Double headers on edge are usually provided across the tops and bottoms, and they should extend to uncut studs on either side.

The roof is supported by rafters of the kinds needed and covered with roof sheathing or slats and shingles or tile.

If a new house is being built it is possible, in certain sections of this country, to obtain certificates from responsible inspection associations attesting the quality and character of the house construction. Such certificates should be sought only from associations or groups which employ competent inspectors to ascertain that the house has been built in strict conformity with a rigid building code and carefully developed specifications. A statement from such an association or from a reputable financing agency, such as a building and loan association, the real estate department of a life insurance company, or the Federal Housing Association, is of real value to the home-buying public.

Permanency of construction depends in part upon the kinds and grades of materials used. The introduction of new materials and advanced methods of construction have unbalanced old standards of judgment to the extent that confusion results when attempting to choose for construction purposes. In an address before the American Society for Testing Materials, John E. Burchard sets forth the properties which materials should have to fit into the modern scheme.[1] They are:

1. Relative permanency of dimension: Materials must not change so much with normal changes in temperature and humidity as to cause major defects in the structure or even annoying failure of parts such as windows to operate properly. For factory-built housing this property becomes still more important. The changes after fabrication and before

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[1] John Ely Burchard, "The Role of Materials in Modern Housing," *The Architectural Record*, vol. 78, pp. 342–343, Nov., 1935.

erection must never be so great as to defeat ease of erection or an accurate result therefrom.

2. Lightness: Materials must be light enough to permit economical shipment and reasonable deadloads. This is a property to be measured in terms of the weights of the required sections. Material weighing 500 pounds per cubic foot, but usable in thicknesses of 1/8 inch, would accordingly be regarded as lighter than material weighing 30 pounds per cubic foot but requiring a minimum thickness of 8 inches.
3. Adequate strength: Most materials now used in house buildings are if anything too strong. Where this excess strength does not cost anything it is of course no handicap. Materials must be carefully regarded whose strength in most respects is adequate but which have one type of weakness such as shearing or tensile strengths materially less than their compressive strengths.
4. Durability: For materials to be used outdoors, durability against weather erosion and against gases normal to the atmosphere and against water; for the interior, durability against water, alcohol, household cleansers, rapid heat and humidity changes, children's fingers; for concealed materials, durability against water, gases common to the atmosphere, and vermin.
5. Reasonable resistance to breakage from impact shock which will occur primarily in the course of shipment or erection: To the extent to which nonshock resistant materials may economically be adequately packed and handled during erection, they may qualify as satisfying this requirement.
6. Good resistance to passage of heat: The requirement applies chiefly to the composite exterior wall and not to each of its collateral materials. But care must also be taken in the use of good conductors not to provide through-sections of such material, however thin. In other words, the wall must have a high total resistance to afford economical heating and must have no spots of excessively low resistance which will cause condensation, an increasing risk as humidified air begins to be used.
7. Good resistance to passage of sound: This is a requirement primarily of the composite interior partition or floor. It becomes more important as increasing mechanization makes our domestic environment more continuously noisy. It will

be specially required in party walls of group housing, in partitions surrounding kitchens and cellars and baths, and in all floors. The conventional floors are not satisfactory in this respect. Prevention of sound transmission in the house will be largely a matter of rigid construction. There will be few rooms so large as to require sound-absorptive materials in addition to that afforded by normal furnishings. In fact, to the man of today an excess of sound-absorbing material in a small room creates a peculiar and unpleasant condition.

8. Fire resistance: Our houses are not so fireproof as they ought to be. But in the early quest for cheaper housing, it must be remembered that lowered insurance rates for fireproof construction do not offset interest on the increased costs at present. There is relatively little risk to life in the burning of a small detached house. In group housing proper planning can minimize the risk of fire spreading. It will be a long time before the normal furnishings of our houses will not supply adequate fuel for a hot fire. Meanwhile also, few materials now used, except concrete and the ceramics, can be said to be fireproof in the presence of a hot fire. Metals, for example, although they will not burn, soften to the danger point and are little better in this respect than timber.
9. Weather resistance: In contrast to durability against weather this means the property of materials used on exteriors to keep the winds and the snows and the rains out of the house. In a sense it is coupled with durabilty in that the material must not only perform this function at the outset but must continue to do so thereafter. Hence a material that was not destroyed itself but lost its protective property could not be said to be durable.
10. Beauty: This property need apply only to those materials that are seen. In modern design, however, there will be tendency to use fewer and fewer materials that do not show. Fortunately, it is a property possessed by every material. No honest composition, either of nature or of man's synthesis, fails of beauty when it is well synthesized and well used. Man has learned to produce good examples of the various genera of materials. He has not always learned to use them well and materials are all too often amenable to bad usage. As long as used in the simple and straightforward way in its own milieu and not in that of another, any material will be beau-

tiful. This is perhaps the greatest lesson modern design is teaching us.

When judging the adequacy of construction, familiarity with the common materials used is important. In a short space it is impossible to cover this subject adequately but some important points concerning it follow. Wood construction has long predominated in the building of homes wherever timber has been available. To secure durability and freedom from maintenance expense certain precautions are necessary with wood construction. Exposed woods should be painted or treated with a preservative to prevent decay, to produce the desired color, or to emphasize the grain. Inclosed members should be ventilated to prevent dry rot. Supporting wood members should be elevated above ground level on suitable dry masonry foundations and in many sections should be treated to prevent the invasion of termites. All wood used should be well seasoned and of a kind which has been demonstrated to last indefinitely.

Some masonry types of construction are adaptable for use with a wood frame. These, which include brick and stone facings and stucco applied over wood, depend for their permanency on the structural frame rather than upon their own qualities. Masonry facing eliminates the necessity of painting, changes the appearance of the structures to one of solid masonry construction, and introduces fire-resisting qualities.

Brick is a synthetic structural material that is suitable for all types of dwellings. It is used in a number of ways, including brick facing over frame, brick facing backed by hollow clay tile, hollow brick walls, and solid brick construction. The quality of brick construction is dependent upon several factors. The quality of the brick itself may range from soft common bricks, through hard-burned common bricks to the almost vitrified face bricks. The quality of construction itself is affected by the porousness of the mortar and the method of laying the brick in it. Then, too, the weight and thickness of the wall affects the quality. In general, however, the weather tightness and durability of a brick wall are more dependent upon the workmanship and the mortar than upon the brick, as almost any kind of brick withstands weathering for ages.

Cut stone of limestone or marble used as a facing material is generally backed by hollow tile. It is a satisfactory building material even in small houses if a suitable setting is provided. In effect stone tends to diminish the apparent size of a structure because we customarily use the sizes of brick as a unit for estimating the scale of a building.

Some newer structural materials for building dwellings are reinforced concrete, steel and other metals, and glass. Concrete is unusually strong and extremely permanent and fireproof. If reinforced concrete is used for the structural frame and exterior walls, it may be employed also for the interior structural members, including the floor and the roof. Unfortunately, concrete can seldom be used without insulation and most persons do not care for it as floor surface or as interior wall finish.

Steel construction in residential buildings is accomplished by using frames and panels fabricated at the factory and delivered at the site. Although the cost of steel is a little more than that of the wood it replaces, its use does eliminate structural defects such as those due to crossgrain shrinkage and the like. Where metal frames are to be used, however, the problem of condensation arises and, moreover, the insulation which must be applied over all metal construction results in an additional cost factor.[1]

A few other metals used for construction purposes, notably copper and aluminum, undergo normal atmospheric corrosion with end products that are attractive. Protective alloys have been developed for nearly all other construction metals, including steel, but as long as rare elements must be used in the alloys they remain definitely in the high-cost field. Examples of the use of metal in subsidiary construction include: electro-sheet copper to produce built-up roofing; aluminum foil for insulation; and steel and other metal for flashings, sashes, and trim.

A material in the ceramic field which is only beginning to be used in the building industry in this country is glass. Al-

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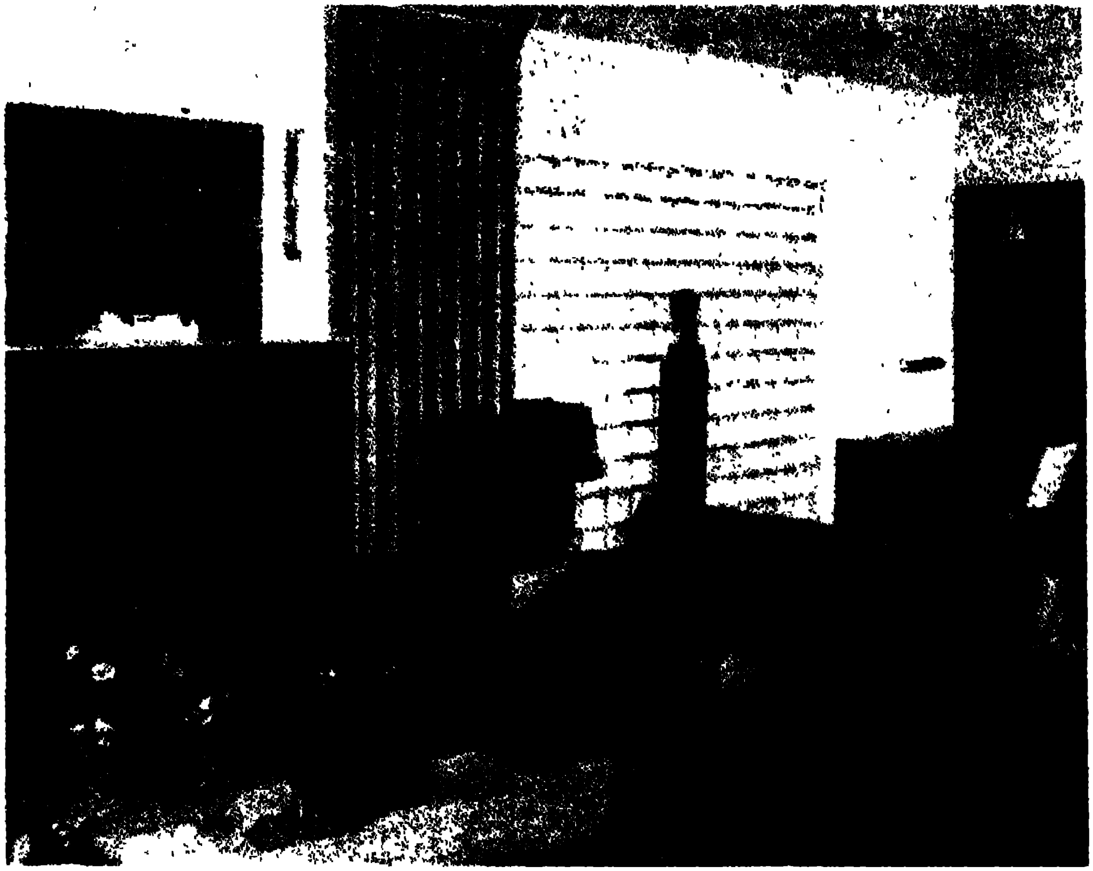
[1] *Ibid.*, pp. 343, 346.



Courtesy Owens-Illinois Glass Co.

Structural glass is at once strong, decorative, and translucent.

though its use as a facing material is confined mostly to nonresidential buildings, glass bricks, if they can be reduced in cost, have excellent construction possibilities for dwellings. Glass has certain qualities which lend themselves to construction uses. One authority writes concerning glass:

> It is a good fire-stop; it is nonporous; does not suffer surface cracking; absorbs no odors; is impervious to air, water, grease, most acids, and all vermin; does not lose its hardness or brilliance on exposure to moisture; its polished surfaces do not disintegrate, they retain their luster, they are ideally easy to clean.[1]

The structure of a dwelling cannot be called desirable if it is such that the place can be infested by rodents. Rats and mice require both food and shelter for their well-being, and they cannot persist where either of these elements is lacking.

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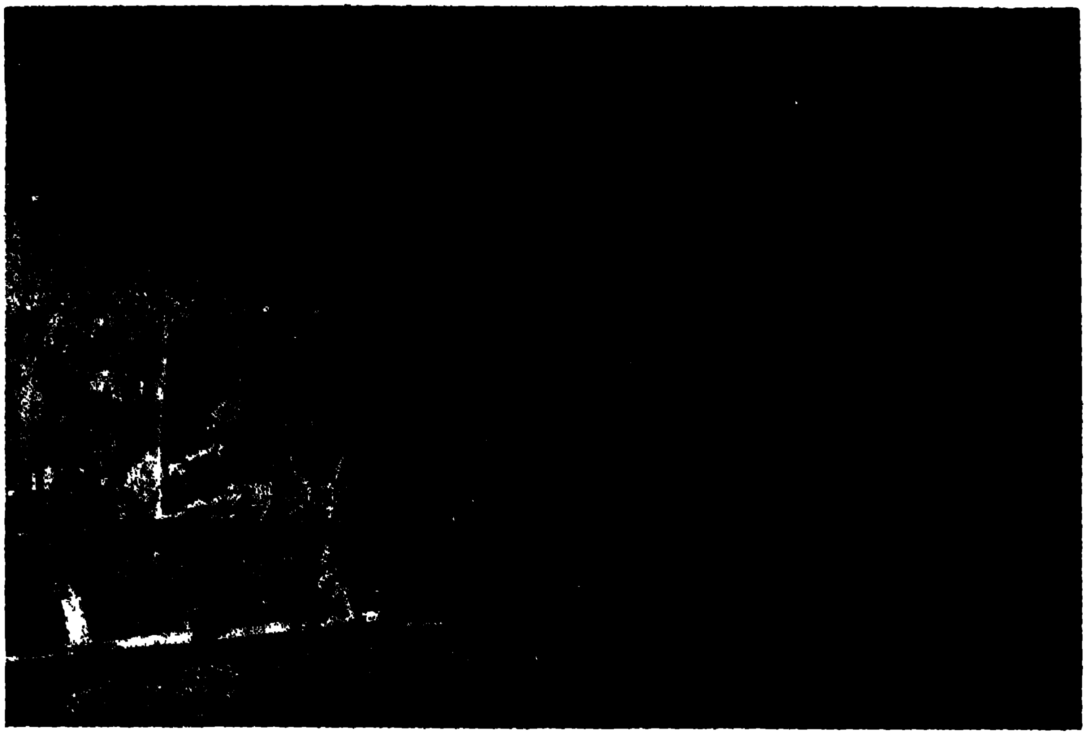
[1] *Ibid.*, p. 346.

The principles of modern construction of buildings are opposed to everything conducive to the best interests of the rat. They call for the liberal use of indestructible and noncombustible materials, such as concrete and steel, and these cannot be gnawed through. If in addition to fire-stopping the exterior of those parts of the structure accessible to rats, including porches, is constructed of materials resistant to gnawing and all openings are either permanently closed or protected with doors, gratings, or screens; and if the interior of the building offers no safe harborage for rats in the form of dead spaces such as unsealed double walls, spaces between ceilings and floors, staircases, and boxed-in pipings, then the place will be both fire- and ratproof. Sanitary features that provide for hygienic storage of food leave the rat and mouse without anything to eat.

All new buildings should be made rodentproof. When plans are made for a building, the rat problem is frequently overlooked, because rats are often not present near sites selected for new structures. They are apt to come later, however, and should be taken into account. Modern structures are so nearly ratproof that to make them so completely requires only slight and inexpensive changes. Cities in growing numbers have added ratproofing clauses to their building ordinances with such good effect that others are sure to follow their lead.

Another menace which should be considered in planning the structure of a dwelling is the termite. It is alleged that millions of dollars of property damage annually is the result of the activity of these pests in dwellings not protected from their ravages. Termites, sometimes known as white ants, are destructive native insects of which 44 species occur in the United States. They are destructive wherever they are found, but in the Southeastern, Central, Western, Southwestern and Pacific Coast States their damage to the woodwork of buildings is especially severe.

Termites resemble true ants in appearance and in their habits of living in large colonies with definite social organization. The male and female are winged and are not injuri-



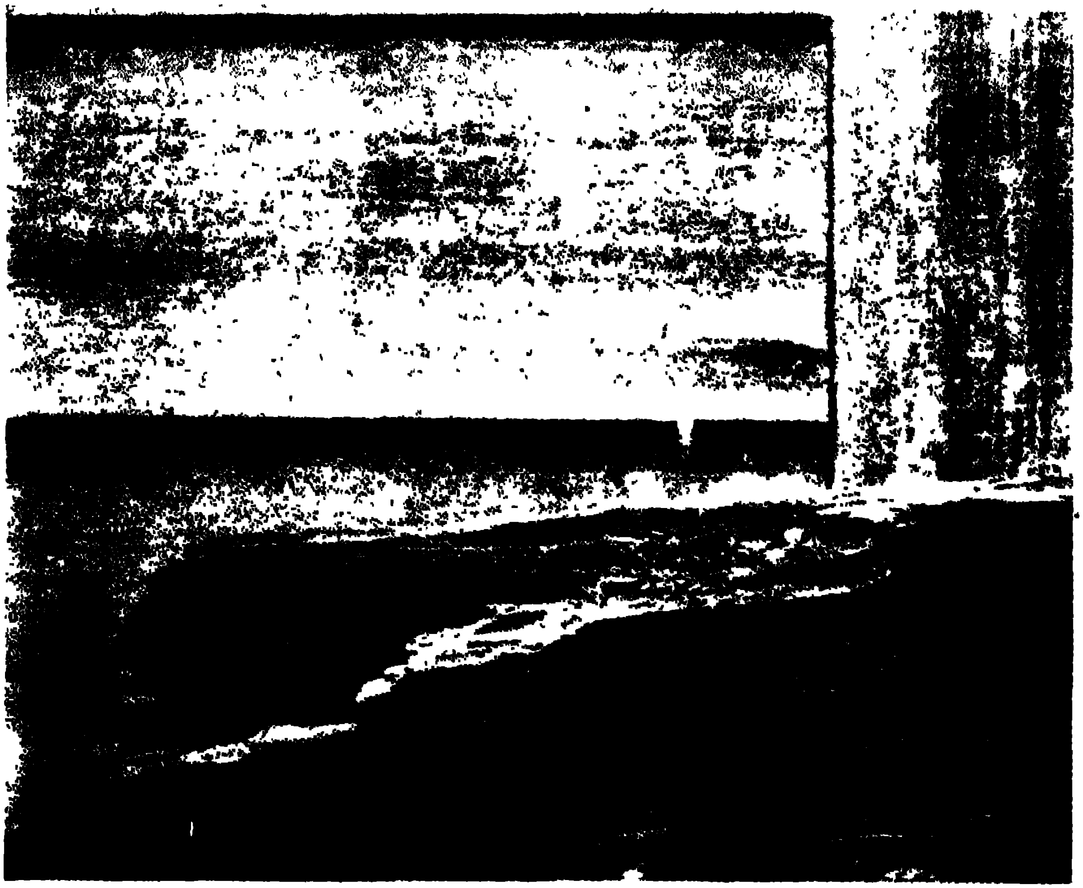
Courtesy Wood Preserving Corp.

View of a foundation wall showing tubes built by termites. Note the size of the one in the center of the picture near the base of the wall. Numerous smaller tubes seen in the picture extend vertically on the wall.

ous. They are the parent termites and they swarm in the spring and fall to form new colonies. Their descendants, the wingless workers of the new colony, are very destructive. The workers are rarely seen for they crawl about underground or in wood. If they wish to reach wood above ground they build earthlike tubes to crawl through so they are always under cover.

Termite damage is always hidden inside the wood. The interior of joists, beams, or other timbers of a building may be eaten out before it is noticed. The subterranean termites do the greatest damage to buildings by weakening the supporting timbers. If their source of moisture is removed they dry up and die.

To prevent subterranean termites from reaching the woodwork of buildings, the foundations, including the pillars in the basement, should be constructed entirely of stone, brick, concrete, or concrete and steel. If stone, brick, or concrete



Courtesy Extension Service, U. S. D. A.

Results of the work of termites. Structural timbers may be weakened to the breaking point while the exposed surfaces appear untouched.

are impractical for foundation materials, timber impregnated with coal-tar creosote [1] should be used and no untreated wood should come in contact with the ground. Sometimes metal barriers are used to prevent the invasion of termites. A sheet of noncorroding metal is inserted into the masonry and the projecting edges are turned downward at an angle to prevent communication with the earth and moisture.

Dampness, warmth, and darkness attract these insects. Complete dryness of foundation timbers and basement walls and flooring is an important aid in rendering buildings safe from attacks by termites.

If an old house or a ready-built new house is being bought or considered for renting, judgment must be made wholly on what is visible or accessible in the completely finished structure. Sometimes it is impossible to obtain reliable information from outside sources, and it then becomes necessary to rely on personal observations, for which preparation may be scanty. It has been suggested that personal inspection of a prospective home be made on a rainy, windy day, which would afford opportunity to check on the following pertinent questions:

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[1] Creosote-treated wood should be completely saturated and not merely coated.

1. Are there eave troughs, adequate and sound, over the entrances?
2. Are the porch floors free from puddles that collect when the floor is uneven or its slope wrong?
3. Are the rooms light, despite the outside gloom?
4. Are the ceilings and walls free from evidence of leaks?
5. Are there any plaster cracks in rooms, or cracks in the masonry of the basement?
6. As you stand by windows and doors, are you conscious of cold damp air rushing in from the defective joinings about the frames?
7. Is the window glass reasonably clear or does it markedly distort the vision? Are the windows advantageously placed?
8. Ask to have the fireplace lighted so that its cheer and effectiveness may be tested.
9. Do the floors spring and creak under your footsteps? Do the floors sag? The weather is not responsible for this!
10. Does rapping on the wall give assurance that the plaster is sound? Does it give the hollow sound that indicates proper furring in the plastering of frame houses?
11. Check the apparent condition of the heating system, and attempt to ascertain
    (a) Is it adequate?
    (b) Is it in good condition?
    (c) Is it efficient, reasonably economical in operation?
12. Check the water and plumbing. Is the water pressure adequate so that water will be simultaneously available on two levels or from two faucets? Are there major replacements that must be made in the plumbing?
13. Is the garage structurally sound and long enough for the car?
14. Is there any evidence that the drainage of the site is toward,

rather than away from the house? Seeping basement walls are unpleasant.

15. Are there evidences of the work of termites?
16. Is the house rodentproof?

Important in judging the structure of a house, then, is familiarity with both the function of its principal parts and the nomenclature for them. This affords a common basis for discussion between the home seeker who is building or buying and the architect, contractor, or the real estate agency. The checking of the house on the basis of a fairly long list of pertinent items is recommended as a necessary step in securing a true picture of its fitness.

Familiarity with the characteristics of common building materials such as wood, brick, stone facings, stucco, and the newer, less common ones such as concrete, steel and other metals, and glass are desirable. If an old house, or a ready-built new house is sought, judgment must be made from what is visible or accessible. Although there are certain points on which the buyer may, and should, check, the counsel and advice of disinterested structural experts may well be sought to determine whether or not desirable methods of construction have been employed in such important structural details as the foundation, the frame work, the chimney, and so on. Authoritative statements as to the freedom of the structure from termites should also be sought.

Suggested Activities

1. Visit a house under construction. Take note of principal structural features of the building. What provision has been made for insulation, for protection against termite damages, for safety from fires?
2. Check the building codes of the city or community where you live for any stipulations in regard to building materials, structural characteristics, height of building, and the like.
3. Confer with a homemaker, man or woman, who has recently purchased or built a home or selected an apartment, checking on the following points:
   (a) Was a check list used in evaluating the structure, prior to its construction or purchase?

  (b) In what way, if any, has the house been made fire resistant, termite resistant?
  (c) What provision has been made for noise absorption?
  (d) What insulation has been used?
  (e) What corrections, if any, would the owner or renter now wish to make in the structure of the house?
  (f) What provision for air conditioning is made?
4. Make up your own check list of desirable construction and planning features. Use the check list to evaluate a newly constructed house or one offered for sale or rent.

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Problem 8. WHAT HAS BEEN THE ROLE OF THE GOVERNMENT IN HOUSING?

The role that government of this country has had in the housing of its people began early and has dealt with such problems as taxation, assistance to obtain and maintain ownership, setting up standards of construction, of maintenance of the structure in a condition healthful for the inhabitants, and assistance in the demolishing of slums. Some of the controls have been on a national basis while others are state-wide or local. As in other situations the role has been complex and laws have had interrelated effects.

In early colonial time houses were made without windows or with very small windows because of a high tax on window glass for tariff. The effect of this was restrictive and led to its eventual repeal. Later the settlement of the Great West was stimulated. This was the Homestead Act of 1862 which bestowed free farms of 160 acres on citizens or prospective citizens, the condition being that they occupy and improve the land for five years. This required construction of some sort of houses. By 1883, 26 million acres had been granted by this act.

Around the turn of the nineteenth century social interest in rehabilitating the poor led to attempts to solve the question of decent housing. The tenement population of New York City had grown from 21,000 in 1879 to 1,500,000 in 1900. The death rate was 62 per 1,000 in these dilapidated, ill-ventilated, filth-soaked structures, crowded together in solid blocks, as compared with 20 per 1,000 for the city in general. Over half the fires took place in the slum districts, although they contained less than a third of the city's buildings. Between 1865 and 1900 the New York legislature made attempts to regulate the building of tenements; but through faulty laws, lax enforcement and greedy landlords the situation had not improved. By 1901 a comprehensive and detailed New York tenement house law was passed by the legislature. This law created a Tenement House Department for its administration. A number of cities and a few states passed similar laws in the next few years based on that of New York. It is the most significant regulatory act in America's history of housing.

The Beards have this to say of the period:

> As the right of the individual to look after his own diseases had once been deemed sacred, so the right of property owners to herd tenants like cattle into buildings, and yet wrench exorbitant rents from them as human beings, had been regarded as a vested

privilege, never to be invaded by government—to be protected in fact to the last penny.

Out of the exercise of this privilege came housing conditions "indescribable in print," as a New York tenement house report of 1903 put the case: "vile privies and vile sinks; foul cellars full of rubbish; dilapidated and dangerous stairs, plumbing pipes containing large holes emitting sewer gas throughout the houses; rooms so dark that one cannot see the people in them; cellars occupied as sleeping places; pigs, goats, horses, and other animals kept in cellars; dangerous old fire traps without fire escapes; buildings without adequate water supply—the list might be added to almost indefinitely.

In such places lived thousands of industrial workers in the United States, into them crowded new immigrants from Europe. What was to be done about them? They furnished millions of dollars annually in rents and increased land values. One of the most opulent and fashionable religious bodies in New York City had large investments in such property. Thus powerful private interests were arrayed against change and denounced change as subversive and revolutionary.[1]

From exercising public control over houses and buildings in the interest of the public welfare, it was a logical step to the concept of planning cities for the general interest. Under the stimulus of free enterprise, American cities, with a few exceptions, had grown up rapidly and in a haphazard fashion. But little attention had been given to the convenience of industry and commerce or to the comfort and wholesome living of the residents. A city-planning movement came into being because of a growing consciousness that factory legislation, health protection, and tenement control are in some way connected with city life as a whole. The city-planning movement began in 1905 at Columbia, South Carolina, and San Francisco. A city-planning commission was created in 1907 by the city of Hartford, Connecticut. This commission was empowered to make but not enforce general plans for the control of building in the community. Other municipalities followed their example, and in 1909 the National City Planning Association was founded. By 1940 over 1100 cities and towns had planning boards.

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[1] Charles A. Beard, and Mary R. Beard, *A Basic History of the United States*. The Blakiston Company, pp. 405–46. Philadelphia, 1944.

New York City in 1916 set a new pace by adopting zoning requirements to reduce the hazards of fire and peril to life and to prevent unwholesome and dangerous congestion, both in living conditions and in street and transit traffic.

The next evidence of an awakening social consciousness of the importance of housing lay in the financing of farm homes. The Federal Reserve Act of 1913 relaxed the restrictions on farm mortgage loans for national banks and provided better facilities for short-term credit to farmers through the discount privilege and eligibility provisions. The farmer, however, needed long-term credit. The Federal Farm Loan Act of 1916 supplied long-term credit ranging from five to 40 years and provided the first amortized mortgage in agricultural finance. It helped to capitalize the operations of 12 Federal Land Banks and set up the Federal Farm Loan Board which has now been absorbed by the Farm Credit Administration.

In 1916 a Council of National Defense was created to study ways of protecting national interests in a world at war. A committee which covered health and welfare realized in 1917 that the lack of housing would hamper a sudden expansion of war industries. Publicly financed, planned communities in industrial villages were built first by the War Department and subsequently by the Emergency Fleet Corporation and the United States Housing Corporation.

In 1919 the Federal Building Loan Act was introduced in Congress but failed to pass. Its main purpose was to encourage home ownership and to stimulate the buying and building of homes. At that time this aid was regarded as unnecessary because an uncontrolled building boom developed which facilitated building but disregarded sound savings and mortgage lending practices. The volume of building was based on the profit motive rather than the demands of the market. The real estate depression that followed this boom in the 1930's plagued all owners, individuals, institutions, or municipalities.

The Department of Commerce in 1921 had created a Division of Building and Housing whose aim was to encourage home ownership on a sound economic basis. A publication, *How to Own Your Home,* purported to serve as a guide for the prospective homeowner. They were urged to make liberal allowances for other budgetary expenses and to limit the value of their homes to twice the value of their annual income.

The "Better Homes in America" movement of the 1920's had the Department of Commerce behind it. Secretary of Commerce Hoover served as president of the Better Homes in America and Vice President Coolidge was chairman of its Advisory Council. Volunteer committees served as local media to bring to all citizens in need of information concerning that which the government could give. Sponsoring agencies include the Extension Service of the Department of Agriculture, the Parent-Teacher Associations, the Federation of Women's Clubs, supervisors of home economics, chambers of commerce, and other civic organizations. By 1930 there were over 7,000 of these committees. They conducted Better Homes programs for the study of local housing conditions and for lectures on home ownerships, home building, home financing, and related subjects. National Better Homes Weeks were observed and many committees had year-round campaigns.

In the late 1920's the Department of Commerce sponsored the National Committee on Wood Utilization. This committee published a bulletin entitled *How to Judge a House* which was designed as an aid to the prospective homeowner.

The conference on Home Building and Home Ownership was called by President Hoover in 1931. The whole subject of housing was divided for study among 31 committees, which conducted their researches for as long as a year. An enlarged conception of the problem and its ramifications was the result. Lengthy reports growing out of the work of the conference pointed out the obstacles then existing to a healthy home ownership. Recommendations were made to put home ownership on a sounder basis, e. g., 25 per cent down payment, full understanding of the risks involved, and the need of eliminating obsolete and hampering legislation.

The Federal Home Loan Bank Board created by the Federal Home Loan Bank Act of 1932 to facilitate home ownership operates through 12 Regional Home Loan Banks. These maintain a permanent reserve for short- and long-term credits for member institutions, who make mortgage loans to individual borrowers for home ownership.

When mortgage foreclosures became prevalent, Congress, in 1933, passed the Home Owners' Loan Act, an emergency measure to be administered by the Federal Home Loan Bank Board. The Home Owners' Loan Corporation (HOLC) extended credit to distressed homeowners by buying their mortgages from such financial institutions and individuals as held them and were unwilling or unable to grant further extensions and concessions to the mortgagor. Over a million mortgages were acquired but no new applications for refinancing were accepted by HOLC after June, 1936.

In 1934 Congress added the Federal Savings and Loan Insurance Corporation to the supervision of the Federal Home Loan Bank Board. This insures the accounts of such associations as elect to join the Insurance Corporation. Besides restoring the security of the individual depositor, this type of government assistance gives stability to the lending institutions and increases their lending confidence.

The Federal Housing Administration (FHA) was created by the Congress in 1934. It loans no money nor makes any grant of Federal funds. It does insure loans made by banks, building-and-loan associations, insurance companies, and other private lending institutions for financing existing homes, for the construction of new homes, and for the modernization and repair of all types of structures. FHA insured mortgages on new homes run for as long as 20 or even 25 years, are amortized at regular intervals, and carry interest rates of only 4½ per cent plus ½ per cent insurance premium on the loan. The down payment may be an equity as low as 20 per cent on homes constructed for sale or rental under peacetime regulations, 10 per cent on homes built for self-occupancy under peacetime regulations, and as low as 10 per cent for homes built for sale or rental under special provisions enacted for war housing.

The first homes built with public funds in this country were those constructed to house war workers during World War I. In European countries working men's homes were built with public moneys. Nothing of this kind was done in this country until, as a means of putting idle men to work, the National Industrial Recovery Act authorized under public regulation or control the construction, reconstruction, alteration, or repair of low-cost housing and slum-clearance projects. As a part of the Public Works Administration (PWA), a Housing Division was created in 1933.

The PWA started a low-rent program by making loans to private limited-dividend corporations who in return for partial tax-exemption privileges and low interest rates agreed to limit their profits and place a ceiling on the rents charged. Only a few of these corporations were able to present acceptable cases for application. Then, too, they were aiming to meet the needs of those above the lowest income groups. In order to fill the most dire needs, in 1934 the PWA began a program of direct Federal construction of housing projects. There being no local agencies set up to build, the Federal Government itself undertook the development of low-rent housing projects as owner paying the full cost out of appropriated funds and meeting maintenance and operating expenses from rentals. Fifty-one housing projects were built in 36 cities. These were apartment house or row-house construction because of the economy of construction. The PWA asked for the creation of local housing authorities to administer the business of the finished projects. These housing authorities were created by local initiative and validated by state law.

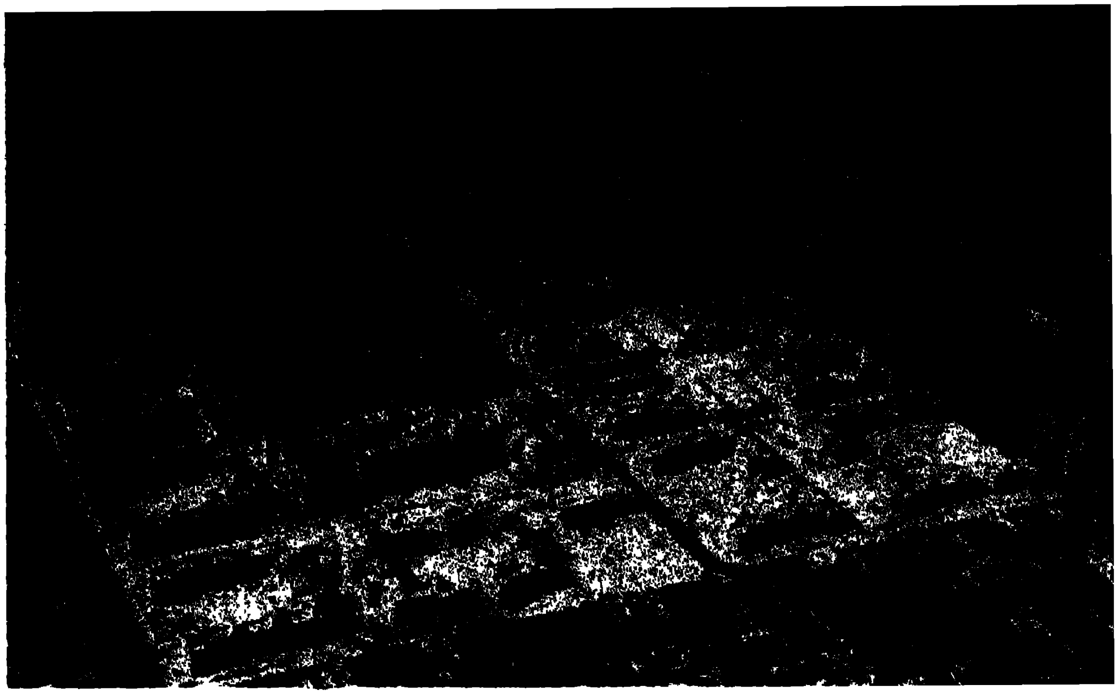
A comprehensive program for rehousing the poorly housed was started when the Wagner-Steagall bill of 1937 established the United States Housing Authority. By this act loans are made to local public agencies, or the local housing authorities, for the purpose of constructing low-rent housing projects built under the direction of the agencies themselves.

The USHA loans were limited to a maximum of 90 per cent of the development cost of the projects. This loan was to be amortized over a period of 60 years. The remainder of the cost was raised locally, often through the sale of bonds of the local housing authority. Although these bonds have a low interest rate they are attractive to the private market because they are tax exempt and because of the annual contributions which the Federal Government is pledged to pay toward the payment of interest and principal on them. This contribution amounts to the difference between the annual cost of providing the housing and the annual low rentals which are fixed for the low-income families occupying the houses. These annual contributions are the means by which the rents are kept low and are matched by local annual contributions amounting to at least one-fifth of the amount of the Federal contribution. The local contribution is usually made by giving tax exemption to the projects and some payments of service charges in lieu of taxes.

The USHA program was delayed for a time pending the development of local housing agencies. By the end of 1938, 142 cities had received commitments for building low-rental dwellings. Meanwhile, the more liberal terms offered by the FHA induced a speeding up of private construction. By the end of 1940 the USHA had helped to provide living quarters for about 245,000 members of low-income families at rentals within their means.

By the end of 1941 the USHA was on a 100 per cent war footing. New urban building was authorized for war housing alone, and the slum-clearance program for the duration consisted only in the management of homes for low-income families.

On February 24, 1942, under his war powers, the President united all 18 or 20 existing federal housing agencies under a single head, the National Housing Agency. Through the National Housing Agency government housing policies were unified and more closely co-ordinated with programs for production and manpower mobilization. Operations were carried out through the three constituent units of NHA: the



Courtesy Federal Public Housing Authority

These are Jane Addams Houses, Chicago, built with public funds. Note amount of clear space around the apartment houses in comparison to the amount around the neighboring dwellings.

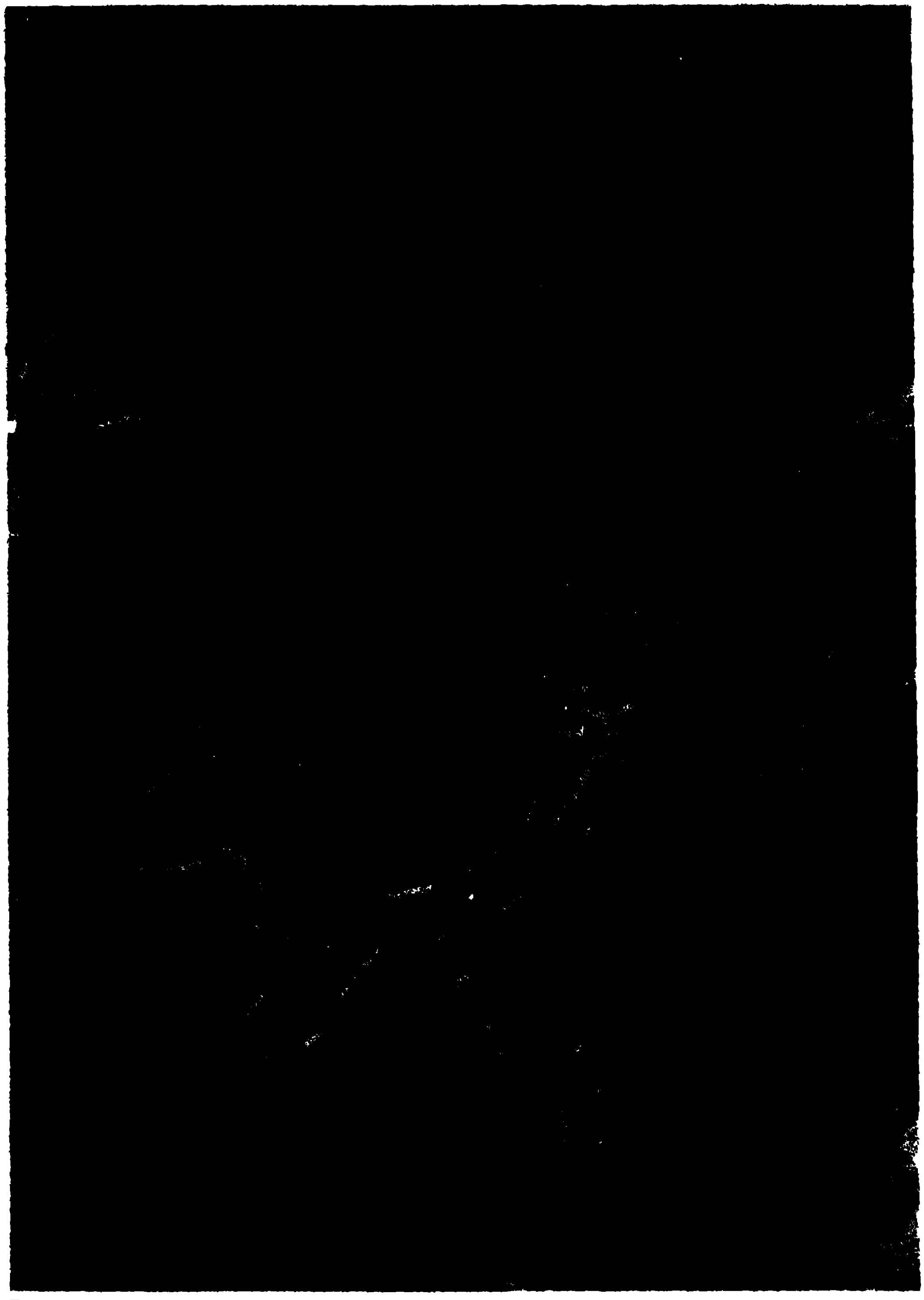
Federal Public Housing Authority managing publicly financed projects; the Federal Housing Administration, assisting privately financed construction through mortgage insurance; and the Federal Home Loan Bank Administration, continuing its original assignment.

The Resettlement Administration was developed in 1935 with the avowed purpose of bringing together houses, land, and people in such a way that the economic and social structure would be permanently strengthened. Agricultural communities were designed to provide social and economic advantages to farmers in sparsely settled areas whose isolation had denied them these advantages in the past. The farmers were brought together in villages of from 50 to 500 families, where the principles of co-operation and the division of labor are put to work in their interest. Another project of the Resettlement Administration was the "greenbelt towns." Three of these communities, satellites to large cities, were built: Greenbelt, near Washington, D. C., Greenhills near Cincinnati, and Greendale near Milwaukee. Each community has surrounding it an area of farms and woodlands which affords the town permanent protection against undesirable developments and presents opportunity for the development of recreational facilities, allotment gardens, and for the blending of the town with the life of the adjoining rural communities. Within the town are the shops, stores, and offices which are necessary to the ordinary requirements of its size, as well as schools, recreational facilities and community buildings. The residential streets are a system of super blocks which reduce the danger and noise of heavy traffic as well as contribute to the convenience in the use of the private automobile.

The Farm Security Administration, although active in this field, is not primarily a housing agency. Its principal job is to help farm families on or near relief to become self-supporting. In cases where a family had to be relocated in order to find land capable of supporting a decent standard of living, it is necessary for the FSA to build houses or arrange for their construction. The projects varied from housing for small subsistence homestead communities to separate dwellings on scattered farms. The Farm Security Administration continues to aid its clientele to build farm homes through long-term, low-interest bearing loans and through homes built directly by the government. In addition the FSA has had as its activities the formation of migratory camps for transient farm workers, temporary houses for displaced farmers, and the construction of permanent defense housing provided for in the Lanham Act.

During World War II housing of war workers of various kinds was administered by departments under the National Housing Agency and the Army and Navy. The three major operating units under the National Housing Agency and their operations were:

1. The Federal Home Loan Bank Administration, which provided a national credit reserve through the Federal Home Loan Bank System; insured savings of investors in home financing institutions through the Federal Savings and Loan Insurance Corporation; and supervised the Home Owners' Loan Corporation.
2. The Federal Housing Administration, which insured home mortgages made by private financing institutions and processed all priorities for privately financed war housing.



Courtesy Farm Security Administration, U. S. D. A.

Greenhills, Ohio, seen from the air. Note that the homes are arranged to permit a maximum of country-like surroundings.

3. The Federal Public Housing Authority, charged with responsibility for publicly financed war housing and the prewar low-rent slum-clearance program carried out by local housing authorities.[1]

Because of the concentration of authority vested in the National Housing Agency, the interests of housing were represented in the highest wartime councils, and reports were made to Congress on over-all programs and policies. Utilization of the housing resources of private enterprise and the Government was possible for the sheltering of migrant war workers. The NHA acted as claimant agency before the War Production Board, thus controlling the limited flow of materials for all civilian housing construction. Unfortunately, in many cities and other centers the character of the structures and their placement both render many of the wartime houses unsuitable for permanent occupancy.

Suggested Activities

1. What action have the governments of other countries taken in the development of their housing? England, Sweden, Russia, France, Canada?
2. What function have the Greenbelt Towns had?
   (a) Do they carry out the garden city principle?
   (b) Do they make a contribution toward better city planning?
   (c) Do they make a contribution to better site planning?
3. What was the function of the "Better Homes in America" movement?
4. What has been the extent of building under each of the housing agencies set up by the government?
5. Why is it necessary for the government to aid in the rebuilding of slum areas? What misconceptions are prevalent in regard to this?
6. Are there any Federal or State Bills before a legislative body which have bearing on the housing situation?
7. Describe some project in wartime housing, listing any characteristics that the houses had that might make their inclusion in the city's permanent housing inadvisable.

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[1] *War Housing in the United States*, p. 10, National Housing Agency. U. S. Government Printing Office, Washington, 1945.

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UNIT FOUR

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Providing Efficient Work Centers and Adequate Storage Space

IT HAS already been pointed out that family life in most, if not all civilizations, meets a three-fold purpose. Through it, continuance of the race is safeguarded, personal relations highly meaningful to the family members and seemingly essential to satisfying living are maintained, and the economic needs of the family and its members are supplied. Because family life deals with emotional needs as well as economic, and because the heritage of customs of simpler days persists in the home long after they have been discarded by the industrial world, it is difficult to consider any one phase of the three-fold purpose by itself.

Kyrk states: "The fact is that in the household, the economic are so intertwined with other relationships, the problems and responsibilities of the members as unpaid productive agents so intertwined with their problems and responsibilities as individuals, as husband or wife, as parent or child, that it is difficult to separate them." [1] She points out that "the associations that result from family life are the valued products, the ends sought, that hold the group together." [2] These associations, although not costless in time and energy are not economic in character or origin. The economic problems of the family *per se* have to do with the supplying of goods and services consumed by the family.

In the usual American family the goods and services consumed are provided either by the earning and spending of a money income or by the utilization of the time, energy, and skills of its members in direct production. Bread is baked, meals are cooked, the laundry work is done, and so on through the manifold activities of the household one may cite all activities that may be considered as direct production of goods or services.

In order to clarify the concept of household production so that its economic bearing might be clearly seen by freeing it completely from the connotation of affectional relationships, the following definition has been phrased by Reid: Household production is limited to those "unpaid activities which are carried on, by and for the members, which activities might be replaced by market goods, or paid services, if circumstances such as income, market conditions, and personal inclinations permit the service being delegated to someone outside the household group." [3]

Provisions for household production are found in the homes of peoples of ancient days. The Hebraic citation of the activities of a good woman indicate the scope of household production in that time. Quoting scattered verses from Proverbs [4] we find the following statements: "She seeketh wool, and flax, and worketh willingly with her hands." "She riseth also while it is yet night, and giveth meat to her household, and a portion to her maidens." "She perceiveth that her merchandise is good: her candle goeth not out by night." "She looketh well to the ways of her household, and eateth not the bread of idleness."

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[1] Hazel Kyrk, *Economic Problems of the Family*, p. 44. Harper and Bros., New York, 1933.

[2] *Ibid.*, p. 46.

[3] Margaret Reid, *Economics of Household Production*, p. 11. John Wiley and Sons, New York, 1934.

[4] Proverbs 31.

The pueblos now being cleared in Mesa Verde show that centuries ago gathering and storing maize in rude clay jars to meet the winter's needs and the making of rude fabrics were a common productive activity in the households of the Indian Cliff dweller on this continent.

The large kitchens of colonial times provided room for a variety of productive activities, including candle making, spinning, food preservation, and food preparation. A loom room in the attic provided for weaving. Although the colonial family was not wholly self-sustaining, it was more largely so than is the family of today.

The shift from a population predominantly rural to one predominantly urban that characterizes our industrial society has been accompanied by a reduction in the number and volume of productive activities in the household.

Although in the southern highlands and other isolated sections, present-day household production includes spinning and weaving, throughout the country at large, these and many other productive activities have largely passed from American homes. Because many major productive activities have been taken over by factories, there is a tendency to regard the home as a unit where goods are consumed, rather than produced. If this is true, it will affect drastically the space needed for various household activities. Hence in any analysis of current housing needs, consideration should be given present-day household production.

Problem 1. IN WHAT PRODUCTIVE ACTIVITIES DO PRESENT-DAY AMERICAN HOUSEHOLDS ENGAGE?

Recognizing that differences abound, but believing that the activities common to all households greatly exceed the dissimilarities that exist, Reid presents the following as a listing of the productive activities of present-day households: [1]

PRODUCTIVE ACTIVITIES OF PRESENT-DAY HOUSEHOLDS

A. Management:
   1. Choice making.
   2. Income apportionment, or budgeting.
   3. Task, time, and energy apportionment.
   4. Planning ways and means for carrying on tasks.
   5. Actual direction of the tasks including supervision.

B. Performance:
   1. Clerical work in connection with management, e.g., the checking and paying of bills, preparing instructions for workers, the keeping of accounts, and making of other records.
   2. Purchasing of food, clothing, equipment, furnishings, and other goods required by the household or by the individual members of the household group.
   3. "Housework":
      (a) Preparation, serving, care and preservation of food, and cleaning away after meals.
      (b) Construction and repair of clothing and furnishings, including such tasks as sewing, mending, darning, and "fancy work."
      (c) Cleaning and care of the house, furnishings, clothing, and equipment, including laundering, daily, weekly, and special cleaning, care of fires, disposal of waste, repair of various kinds, care of pets.
   4. Work outside the house, e.g., care of house surroundings, gardening, dairy and poultry work, operation and care of car.
   5. Care of members of the family not included above:
      (a) Physical care of children and the sick.
      (b) Child training and education, including supervision of play.
   6. Going and coming on household business, answering the telephone, the door, receiving packages, being on call or present in case of need, e.g., remaining in the house because of a sleeping child.

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[1] Margaret Reid, *Economics of Household Production*, pp. 75 and 76. John Wiley and Sons, New York, 1934.

The average number of hours and the percentage of total weekly time spent in the various homemaking activities that have been classed under household production have been investigated by Wilson. Her findings, frequently cited, are reported in the table on page 319.

It will be noted that the average of total hours spent in productive household activity exceeded 60 hours a week. In amplification of these data, Wilson states "Feeding, housing, and clothing together accounted for seven-eighths of the time the average farm homemaker gave to her household. . . . Food preparation was the most important food activity, requiring about twice as much time as clearing away food and washing dishes . . . cleaning accounted for 74 per cent, and care of fires 10 per cent of the time amounts included under house activities."[1]

She points out that 53 per cent of the time given to homemaking by the average homemaker was spent in activities which occur daily, an average daily total of 2 hours 55 minutes being spent in meal preparation and clearing away, and a daily average of 53 minutes being spent in cleaning and straightening the house. When the three main routine activities of weekly occurrence—washing, ironing, and mending—are added to the total for daily routine, the combined activities accounted for 72 per cent of the time given to homemaking by the average farm homemaker.[2] It was found in the Oregon study that more than half of the members of the farm group studied spent seven or more hours a week in farm work.

A study of how the 168 hours of the week are used for homemaking and other activities was made by Warren. This study shows a somewhat similar pattern of the use made of time. About one-third of the homemaker's 24 hours was used for homemaking activities, 4 per cent for farm work, 45 per cent for personal activities, sleeping and resting, and the remainder for miscellaneous activities. The time used for

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[1] Maud Wilson, *Use of Time by Oregon Farm Homemakers*, pp. 16, 17. Oregon State Agricultural College, Agricultural Experiment Station, Bulletin 256, 1929.

[2] *Ibid.*, pp. 17, 18.

THE AVERAGE NUMBER OF HOURS AND THE PERCENTAGE OF TIME SPENT ON VARIOUS HOMEMAKING ACTIVITIES BY ALL WORKERS: 288 FARM, 71 COUNTRY NON-FARM, 61 VILLAGE, AND 93 TOWN AND CITY FAMILIES IN OREGON[1]

Activity	Average Time Per Week *								Percentage of Total Time Spent in Homemaking			
	Farm Families **		Country Non-Farm Families		Village Families		Town and City Families		Farm Families	Country Non-Farm Families	Village Families	Town and City Families
	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.				
Meal preparation and clearing away	27	03	24	50	26	28	22	15	44.3	39.8	42.6	34.4
Care of house	12	17	12	37	13	06	12	42	20.1	20.2	21.1	19.7
Laundering	6	18	6	28	7	44	6	10	10.3	10.4	12.5	9.5
Sewing and mending	4	48	5	41	4	41	5	13	7.9	9.1	7.5	8.1
Care of members	4	26	5	48	6	05	9	10	7.3	9.3	9.8	14.2
Managerial ***	1	50	2	26	2	42	3	27	3.0	3.9	4.4	5.3
All other	4	20	4	34	1	19	5	40	7.1	7.3	2.1	8.8
Total	61	02	62	24	62	05	64	37	100.0	100.0	100.0	100.0

* The time per week includes that of paid workers as well as time spent by family members.

** Farm families are those living in the open country whose main occupation is farming. Families living in villages or towns whose main occupation was farming were included in the village and town groups. There were only two or three of these.

*** "Management" as defined in these studies included purchasing, recording, supervising, and other management.

[1] Maud Wilson, A mimeographed publication of the School of Home Economics, Oregon State College.

homemaking averaged 52 hours for the week, but when the time used for farm and other work was added, the homemakers worked an average of about 61 hours during the week. A table showing the distribution is on this page.

DISTRIBUTION OF THE HOMEMAKER'S TIME DURING THE WEEK[1]

(497 Farm Homemakers in Genessee County, New York, Spring, 1936)

Activity	Average Hours Spent on Activity		Per Cent of Total Time	
Homemaking		51.9		31
Food preparation	16.4		10	
Dishwashing	7.2		4	
Care of house	16.3		10	
Care of clothing and household linens	7.0		4	
Care of individual family members	3.7		2	
Other homemaking	1.5		1	
Farm work		6.8		4
Other work		2.0		1
Personal and sleeping		74.5		45
Leisure and miscellaneous activities		17.5		10
Unaccounted for		15.3		9
Total		168.0		100

A study made by Dickins in the South sought to determine how white and Negro town homemakers used their week of 168 hours. Perusal of the table on page 321 will show a further similarity in the amounts of time spent for the various activities.

The amount of time used for the different items of household production is one criterion of their extent. In a recent study Gross and Zwemer sought to discover the extent of productive activities beyond the routine preparation of food and house care. Their findings summarized on page 322 show that laundering is done in a great majority of the Michigan farm and village homes in the study; that food preservation in large amounts is done in four-fifths of the homes; that clothing con-

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[1] Jean Warren, *Use of Time in Its Relation to Home Management*, p. 19. Laboratories in Home Economics, Cornell University, Agricultural Experiment Station Bulletin 734, 1940.

HOW 160 WHITE AND NEGRO TOWN HOMEMAKERS IN MISSISSIPPI USED THEIR TIME DURING THE STUDY WEEK CLASSIFIED BY HOUSING VALUE

Item	White Homemakers				Negro Homemakers			
	In Families With Housing Value $20 and Under		In Families With Housing Value $20.01 to $40.00		In Families With Housing Value $7.50 and Under		In Families With Housing Value $7.51 to $20.00	
	Av. Time per Homemaker		Av. Time per Homemaker		Av. Time per Homemaker		Av. Time per Homemaker	
	hrs.	*min.*	*hrs.*	*min.*	*hrs.*	*min.*	*hrs.*	*min.*
Work	58	54	55	24	61	12	61	6
Food homemaking	27	12	26	54	26	30	25	54
Other homemaking	23	6	18	36	20	36	22	12
Food production for home use	4	36	5	30	4	36	5	36
Gainful work	4	12	4	12	9	24	7	18
Personal time	108	36	111	26	106	48	106	30
Sleep and rest	67	18	64	12	71	0	69	0
Leisure	23	36	28	6	18	54	20	24
Personal care of self	17	18	19	0	16	42	17	6
Miscellaneous	1	0	0	48	0	36	0	42

struction and mending are done in two-thirds of the homes; and dry cleaning in almost one-fifth of the homes in their study. It is also to be noted that level of income had comparatively little effect upon the extent of these productive activities.

In a Kansas study of 346 farm families, Gunselman [1] found that of consumption items having an average total of $476, home produced food had an average valuation of $263. The total household operation was valued at an average total of $114. Of this, services valued at $24 were contributed by the home. Thus from the standpoint of time used, choices made, and money worth of goods produced and consumed, we have evidence of the significant productive activities being carried on in the home.

Doubtless many phases of household production will pass from the home to the factory in the next decades as spinning,

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[1] Myrtle A. Gunselman, *Farm Incomes and Living Costs for Certain Kansas Families,* p. 22, Table 17 Agricultural Experiment Station Bulletin 327, Kansas State College of Agriculture and Applied Science, June, 1945.

EXTENT OF CERTAIN PRODUCTIVE ACTIVITIES BY ECONOMIC LEVEL AND RESIDENCE[1]

Activity Carried on by Family	Economic Level						Residence					
	Low		Medium		Comfort		Farm		Village		Total	
	No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*
Laundering												
Most	117	98.4	134	97.1	109	87.2	189	99.0	171	89.5	360	94.2
Some	1	0.8			6	4.8	2	1.0	5	2.6	7	1.9
None	1	0.8	4	2.9	10	8.0			15	7.9	15	3.9
Dry cleaning												
Most	14	11.8	30	21.7	17	13.6	38	19.9	23	12.0	61	16.0
Some	15	12.6	32	23.2	28	22.4	40	20.9	35	18.3	75	19.6
None	90	75.0	76	55.1	80	64.0	113	59.2	133	69.6	246	64.4
Food preservation												
None	3	2.5	3	2.2	3	2.4	1	0.5	8	4.2	9	2.4
Fruits and vegetables												
limited amounts	14	11.8	13	9.4	23	18.4	11	5.8	39	20.4	50	13.1
large amounts	102	85.7	121	87.7	98	78.4	178	93.2	143	74.9	321	84.0
Meat	63	53.0	65	47.1	67	53.6	150	78.5	45	23.6	195	51.0
Sewing												
Mending only	43	36.1	43	31.2	37	29.6	51	26.7	72	37.8	123	32.2
Mending and construction	76	63.9	95	68.8	88	70.4	140	73.3	119	62.2	259	67.8

The number in the sample was 382. Economic levels as defined.

	Farm	Village
Low	$750 or less	$1,000 or less
Medium	$750–$1750	$1,000–$2,500
Comfort	$1750 and above	$2,500 and above

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[1] Gross, Irma H., and Zwemer, Evelyn A., *Management in Michigan Homes,* pp. 88 and 89. Technical Bulletin 196, Michigan State College, Agricultural Experiment Station, East Lansing, June, 1944.

weaving, shoemaking, and other activities have already done. It is also possible to predict that certain tasks will remain in the home long after others have been assumed by outside agencies. There is, of course, an interplay of many factors in the shift of tasks from home to factory. Included among these are the ability of the family to pay to have the work done outside, the physical necessity of the work being done in the household, and the enjoyment or dislike a worker has for a given task. In this connection consideration of the table on page 324 is enlightening.

It will be seen that certain work occurring daily in the households of all the homemakers reporting was commonly disliked by the workers. Doing dishes, doing laundry, cleaning and straightening the house, and cooking were the most disliked jobs. Of these activities, doing dishes and cleaning and straightening the house seem, under present conditions, tasks which have only a remote possibility of being removed from household production. Cooking includes a variety of operations some of which lend themselves to factory production more readily than do others. For example, factory production of bread and cakes has been developing with great rapidity. The Oregon study shows that 82 per cent of the non-country non-farm homemakers bought all their bread, and only 9 per cent baked all; the data for the rural group shows a higher percentage engaged in home baking: 35 per cent baked all bread used, 17.6 per cent baked more than half, and 42.7 per cent baked none of it. Even though factory production of bread is increasing, home baking remains an important productive activity. Despite the expressed dislike for laundry work it was shown in this study to be one of the common productive activities of the home. Eighty-six per cent of the farm homemakers and 73 per cent of the non-country non-farm homemakers did all of the family laundry. Only 3 per cent were wholly freed from this household task. Sewing was reported as a frequent task, commonly undertaken by many women without the dislike that was associated with laundry work. About a third of the women expressed a desire to have more time to sew. Yet, there are indications that clothing con-

PROPORTION OF FARM AND NON-FARM HOMEMAKERS EXPRESSING DISLIKE FOR SPECIAL TASKS AND EXPERIENCING FATIGUE FROM THEM [1]

ACTIVITY	HOMEMAKERS *					
	FARM			NON-COUNTRY NON-FARM		
	Spending Time During Week Studied	Expressing Dislike	Experiencing Fatigue	Spending Time During Week Studied	Expressing Dislike	Experiencing Fatigue
	%	%	%	%	%	%
Cooking	99.7	11.8	1.7	99.4	12.3	2.3
Dishes	100.0	22.3	2.2	97.4	21.3	1.1
Canning	36.1	2.4	0.6	20.1	0.0	1.1
Cleaning and straightening	100.0	34.1	31.1	99.4	52.5	48.3
Carrying water	20.1	0.5	2.8	5.2	....	....
Laundry **	....	12.3	43.5	....	4.1	33.3
Washing	96.9	12.8	26.0	96.8	13.9	15.0
Ironing	92.0	9.5	7.9	94.2	9.8	11.5
Laundry total	....	34.6	77.4	....	27.8	59.8
Sewing	71.2	3.3	1.2	79.9	9.0	2.3
Mending	82.3	6.6	....	85.7	3.3	....
Care of children	65.3	0.5	0.6	81.2	....	5.8

* Proportion of the homemakers who answered the questions.
** Not specified, or washing and ironing.

struction is on the decline as a productive activity of the household. Hoyt reports that among Iowa farm families the garments most commonly made at home were women's and girls' dresses, aprons, and underwear. However, of the total expenditure for these items, 71 per cent went to purchase ready-to-wear garments, and only 29 per cent for fabric and other things for home construction.[2] Much more might be said of the reasons back of these trends in the various productive activities of the household. Further discussion, important as it might be in developing an understanding of the economic situation, would not necessarily contribute to our understanding of the relationships between the work to be done and the house as a workshop.

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[1] Maud Wilson, *Use of Time by Oregon Farm Homemakers*, p. 46. Oregon State Agricultural College, Agricultural Experiment Station Bulletin 256, 1929.

[2] E. E. Hoyt, *Value of Family Living on Iowa Farms*, p. 212. Iowa State College, Agricultural Experiment Station Bulletin 281, 1931.

The results of the relatively few studies that have been made on household production indicate that provision for these activities must be made in present-day houses if the house is to aid the worker rather than make her task more difficult. Necessary housing provisions for household production must be determined in terms of the individual situation of each family. In each case answers to the following questions should be available: What is to be done? Where is it to be done? What relationship does it bear to other work? What tasks may need to be undertaken simultaneously with it? Consideration of such details for each of the major productive activities of the home will be taken up in the following problems on planning and developing efficient work centers for the average house.

Suggested Activities

1. List several productive activities of the houschold that seem to be passing to outside agencies; give your reasons for including in this list each of the activities cited.
2. Interview five homemakers, obtaining information on the following points: Is all bread used baked at home? None? If some is made at home, what percentage of the total is it? Is all laundry done at home? None? If some, what percentage of the total is it? How many quarts of home-canned goods were prepared in the home last year? According to the homemaker's estimate, how nearly did this meet the needs of the family for this part of the food supply?
3. Select the farming community with which you are most familiar. List the productive work outside the house in which homemakers in this community engage; which items in the list are most important? The Oregon study showed that more than half of the farm homemakers studied averaged 7 hours or more a week in farm work. In your opinion is this figure representative of the situation in your community? Or is it excessive? Too small?
4. On the basis outlined in 3. analyze the amount and kind of work outside the home done by a typical village or urban homemaker in your state.
5. What effect does the standard of living have on the time spent in household production? Give examples to illustrate your points.

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Problem 2. WHAT ARE THE REQUIREMENTS OF AN EFFICIENT WORK CENTER?

Work centers are the scenes of productive activity in the home and out. A professional man's desk, a carpenter's work bench, a chef's table and stove are each work centers related to the productive activities of persons gainfully employed. In this setting are the worker's tools for doing a specific job, assembled in such a way as to assist in developing a good product, to conserve the worker's energy and time, and to maintain his body in the best health possible. In each case the accumulated experiences of many workers, perhaps supplemented and revised by the findings of efficiency experts, have led to fairly clear-cut standards as to material used, provision to be made for interrelation of processes, and numerous other details.

The productive activities of the homemaker are diverse, ranging from the managerial tasks of choice making, budgeting, and account keeping to the physical labor of such household tasks as dishwashing, cooking, and laundry work. In even one aspect of household production, as in food preparation, serving, and clearing way, several work centers, related but distinct, may be used. The accumulated experience of homemakers which the present-day homemaker inherits, as the lore of her mother and her grandmother, may not be applicable to today's situation, and few efficiency experts have given her problems serious consideration. It becomes, then, increasingly important that homemakers and others interested in household production consider the work centers needed in the home and formulate the requirements for efficient work centers. However, study of the laws governing the development of adequate work centers for the home has only begun. Reliable information on this subject is scant "due to the perennial lack of science dealing with the fundamental laws which seem to govern *man as a nucleus of forces,*" as phrased by Kiesler.[1]

The creation of a work center for the home should take cognizance of information available at this time and should involve further study of the person and the constituents of the job. The objectives sought in the home as in industry are to create as desirable a product as possible, with a low cost in time and energy and with the maintenance of good posture which helps in reducing fatigue and maintaining health. In addition the home worker may desire to reduce the monotony of repetitious works by creating a cheerful and interesting atmosphere and including others in the work process as a factor in sociability.

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[1] Frederick J. Kiesler, "On Correalism and Biotechnique," *Architectural Record,* vol. 86, p. 60, Sept., 1939.

Steps in accomplishing these objectives may be approximately as shown on pages 328 and 329.

1. Analyze the job to be done.
2. Specify the equipment and supplies necessary or available.
3. Arrange the equipment and supplies in the relation to the sequence required for the job.
4. Place the equipment and supplies in relation to the human figure and its ability to use it at that position.
5. Measure the amount of space necessary for the equipment and supplies.
6. Allow sufficient room for passing between the elements for one or more persons.
7. Supply other features which contribute to health or enjoyment, as proper temperature and ventilation, light, comfortable floor, and others.

The making of a Waldorf salad for a small family meal may be a case in point. A breakdown of this job with the accompaniments would be as follows:

Processes in Making Waldorf Salad	Equipment and Supplies Needed
1. Take from refrigerator chilled and cleaned head of lettuce, celery, and red apples.	Refrigerator with proper containers to store lettuce, celery, and apples.
2. Lay them on a tray or a table top.	Table top.
3. Get sharp knife.	Supply of knives stored in a rack above table top or a slotted drawer.
4. Remove stem of lettuce.	Knife, lettuce, tray.
5. Dismember the leaves by holding under the faucet.	Lettuce, running stream of water from faucet into sink.
6. Set the dismembered leaves to drain on a cloth.	Lettuce, table top, clean dish towel taken from drawer.
7. Take several stalks of celery and lay on a chopping	Celery, knife, and chopping board, either detached on the

board. Cut into small pieces with a sharp knife.	table top or one pulled out from under the table top.
8. Get chilled bowl and chilled salad plates from the refrigerator and place the celery in the bowl.	Bowl, salad plates, table space.
9. Reach for walnuts, chop slightly on the board, and place on top of the celery.	Shelf in cabinet, container for shelled walnuts, chopping board above. knife, salad bowl.
10. Cut each of the apples into lengthwise sections, but not through the core in several places, then cut around the apple to the core, and finally across each of these cuts, dropping the pieces directly into the chilled bowl on top of the celery and nuts.	Apples. knife, salad bowl, table top.
11. Get a mixing spoon.	Mixing spoon hanging on rack above table top or in a divided drawer.
12. Reach for the salad dressing. Open the top.	Jar of salad dressing, shelf in a cabinet.
13. Measure out the desired amount with the spoon, dropping it onto the apples.	Spoon, salad dressing, salad bowl. table top.
14. Mix until all parts are coated with the dressing.	Same as above.
15. Lay the salad plates in a row.	Six salad plates, space to lay them out in two rows.
16. Line with the separated lettuce leaves.	Same as above.
17. Place the desired amount of the salad mixture on the lettuce leaves.	Same as above and the salad bowl and spoon.
18. Replace unused salad greens in the refrigerator.	Tray, refrigerator.
19. Rinse salad bowl, spoon, and knife.	Running stream of water from faucet.
20. Wipe off table.	Dish cloth.

From the supplies and equipment noted it is readily observed that those needed for the processes include the following in this order:

refrigerator
tray
table top
knives on rack or in slotted drawer
sink and faucet
chopping board
bin for apples and other fruit
shelves
spoon on rack or in divided drawer
table or shelf space for six salad plates
dish cloth

One can picture a table top between a refrigerator and a sink. Ranged above the table top are enclosed shelves for the usual storage of mixing bowls and supplies, in this case salad dressing and walnuts, if not stored in the refrigerator. There may be a narrow open shelf below the enclosed shelves for setting the salad plates, with space for condiments often used here. A rack for knives and spoons may be here also. Below the table top are the cutting board, drawers, and the bin for vegetables and fruit not requiring refrigeration. This groups all the things necessary for making Waldorf salad and leaves space for the necessary work of making it. The storage of things required for doing some other processes at another time within this same space is also possible. If provision can be made for the needed utensils and ingredients and also for the repetitive jobs in home production as compactly as this, fatigue which results from walking would be sharply reduced. Although the arrangement suggested seems to place facilities to accomplish the processes noted in their proper relationships we have no assurance that shelves for salad dressing and the walnuts can be reached, or that the sink and work surface are at a comfortable height for the person who is to work there. The next step, then, is to consider placement of the objects to be used in relation to the human figure, in order to reduce effort and to maintain good posture.

The types of efforts required in doing the work around the home have been listed as mental effort, visual effort, manual effort, torsal effort, and pedal effort. Knowledge of and type of effort involved is necessary to an understanding of how to shift strain from the human body to some part of the working center or its tool. The outline on this and the next page classifies common activities of homemaking under one of these types of effort:

TYPES OF EFFORTS USED IN HOMEMAKING ACTIVITIES[1]

- Mental effort:
  - thinking
  - reasoning
  - planning
  - decision making
  - directing
  - worrying
  - talking
- Visual effort:
  - eye movements and pauses
  - looking
  - searching
  - watching
  - adjustments to distances and lighting conditions
- Manual effort:
  - reaching
  - raising
  - lifting
  - holding
  - carrying
  - stretching
  - pulling
  - pushing
- Torsal effort:
  - bending
  - leaning
  - rising

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[1] Paulena Nickell, and Jean Muir Dorsey, *Management in Family Living* p. 66. John Wiley and Sons, Inc., New York, 1942.

Courtesy Co-operative Extension Work in Agriculture and Home Economics, State of Nebraska

A narrow shelf in a low storage cabinet makes for good visibility for all objects stored.

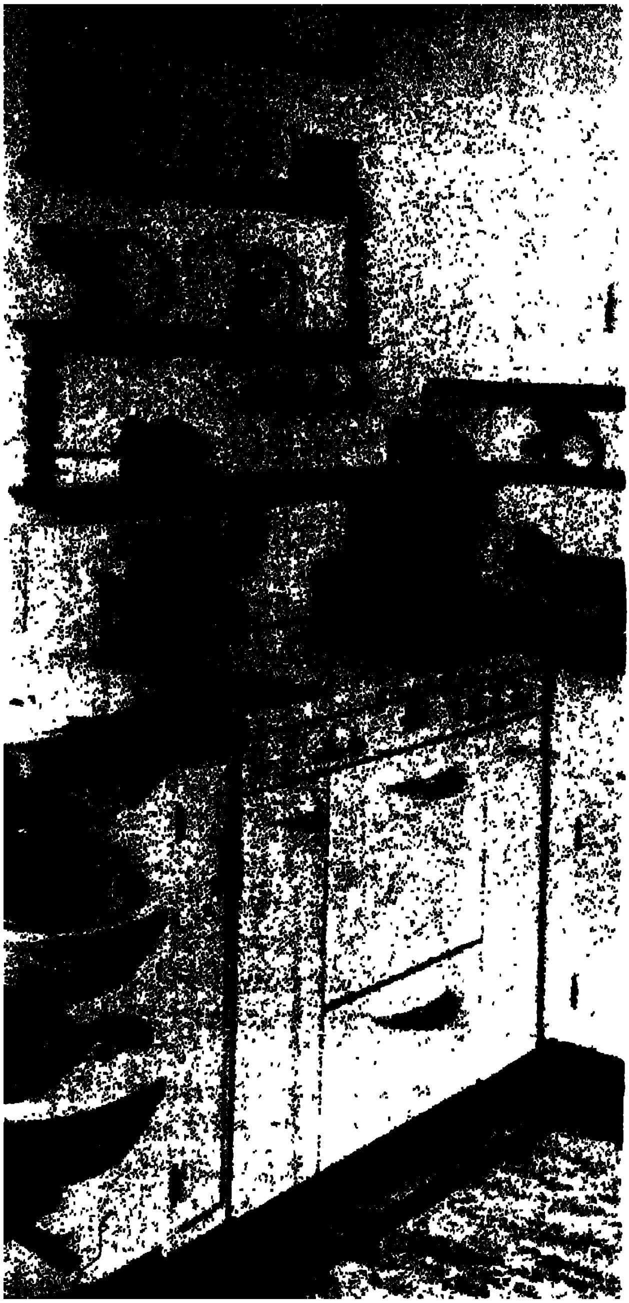
- turning
- stooping
- sitting
- kneeling

Pedal effort:

- moving
- standing

Most tasks about the home require a combination of efforts—mental, visual, manual, and torsal effort of some kind being most common, although the pedal effort is also frequent.

Although it is not likely that a work center reduces the amount of mental effort much, visual effort may be greatly affected by the position of the parts of a work center. The shelf for the walnuts and the salad dressing should not usually be much above eye level, which for many women is 61 inches. Condiments such as cayenne, salt, paprika, cinnamon, nutmeg, and others should be stored at or slightly below this



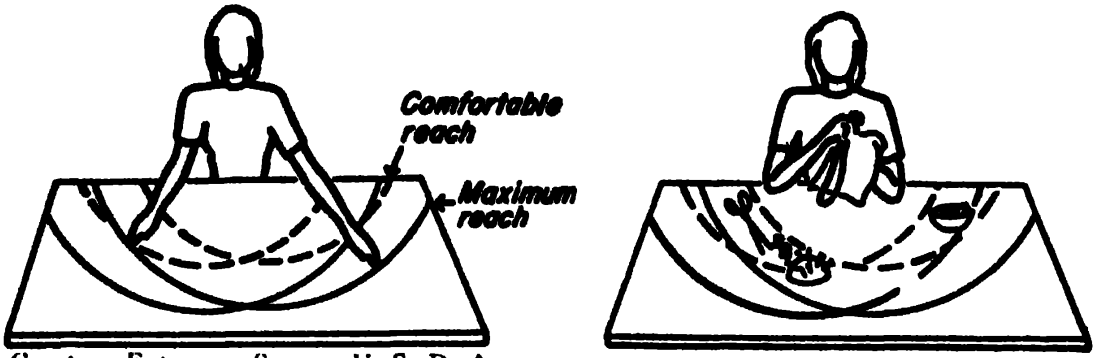
Reprinted from *Better Homes and Gardens* magazine

Narrow shelves between work counter and wall cabinets serve as a storage space for cooking materials which should be quickly available.

height. If it is necessary to follow a recipe it should be possible to place it at a level comfortable for seeing. Adequate light at any work center reduces visual effort.

Manual effort can be reduced by arranging storage so that much-used articles are within easy reach without stretching. Another reason for placing the walnuts and the salad dressing at eye level or below is that they can then be reached without stretching. Heavy articles should be placed so that not much raising, lifting, holding, or carrying is necessary. A favorable place for the salad bowl is in a deep drawer just below the work surface. Then, even if it is a part of a nest, the parts desired can be lifted out without much effort. If shelves are provided for storage of bowls, they, too, should be below eye level. Lifting is reduced if the bowls are separated rather than stored as a nest. Saving effort and assuring safety are both helps if no shelf holding articles in current use is above 71 or 72 inches from the floor. This is the highest shelf a person of average height can reach using both hands. Substantial footing, such as a firm step-ladder gives, should be provided for climbing to reach anything above that point.

The working surface should be large enough to allow for a good layout for the work process, and the storage of equipment and supplies should be close at hand. One of the accepted rules for work simplification directed toward conserving energy is that tools and materials should be located close and directly in front of the worker so as to be within easy reach of the hands. One might study the layout for the jobs to be done on a work surface, at the same time considering the reaches possible for each of the arms. Such a study might result in a diagram similar to the following:



Courtesy Extension Service U. S. D. A.

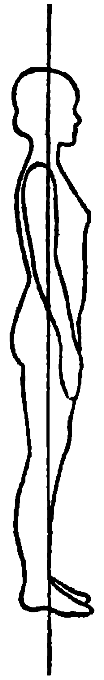
The working surface should be large enough to allow for a good layout for the work process. The area of most comfortable reach is sometimes spoken of as the "precious area."

Torsal effort is somewhat dependent upon manual effort. If the articles in use are placed so that they can be reached and used with a minimum of bending, leaning, turning, stooping, and rising then torsal effort is reduced. When the torso is used in any of these motions the body is out of line and another part is extended to restore balance. If the body is held in any of these positions too long, poor posture attended by fatigue may be the result.

Posture refers to the position in which the body is held. Correct posture is the position which will require the expenditure of the least amount of energy for work or rest. It involves establishing a center of gravity so that the whole weight of the body falls directly on the weight-bearing area below. If any part of the body is off-center, to that degree must some other part be held off-center to balance it, and to that degree will strain result. When the body is well balanced in the standing position, the head will be directly over the feet, and a plumb-line dropped from the ear will pass through the middle of the shoulder, hip, knee, and just in front of the ankle.

The advantages which result from correct postures are classified by Williams thus: [1]

1. Hygienic value: The erect, straight, vibrant body has its organs properly suspended so that bodily functions are more complete and perfect.
2. Economic value: Good postures pay. They speak of the spirit within the body. The young man or woman seeking a business position portrays his or her mental energy or alertness by the way he or she stands or walks.
3. Social value: Despite the influence of pernicious and silly styles, it may be said that personal attractiveness is more properly measured by a splendid carriage of the body rather than by a "debutante slouch."
4. Spiritual value: The spirit is uplifted with a physical uplift of the trunk. The glory of the rising sun is never seen by one walking with protruding head and abdomen and flat-feet.



Good posture is attained when a plumb-line dropped from the ear passes through the shoulder, the elbow, the hip, the knee, and the front of the ankle.

The causes of wrong posture are usually one or more of the following conditions:

1. Holding to one position for too long at a time.
2. Carelessness.
3. Foot-arch troubles. A flat-footed person rarely walks or stands properly.
4. Poor eyesight. A near-sighted person usually pushes his head forward to see more easily.
5. A dispirited mental attitude (lack of self-confidence or self-respect).
6. Malnutrition and overfatigue.

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[1] J. F. Williams, *Personal Hygiene Applied*, Fifth Edition. p. 184. W. B. Saunders Co., Philadelphia, 1934.

7. Poorly fitted garments which continually pull the body out of its proper position.

The results of poor posture include changes in positions of the joints, ligaments, and muscles, and in the location of the organs of the body. Faulty circulation results mainly from the cramping and crowding of the chest which prevents both the heart and lungs from acting as freely as they should and lowers and reduces the mobility of the diaphragm. A drooping posture permits relaxation of the abdominal muscles, allowing a further sagging of the organs. As the abdominal organs sag, they press upon the pelvic organs and interfere with their functions, leading to many disagreeable symptoms. It is thought that the thoracic, abdominal, and pelvic organs suffer from faulty nerve supply because of lack of tone of the muscles on the back. These shifts in position affect the organs so extensively that they could not be expected to function properly. Sometimes youth may carry poor posture without any apparent derangement, but by middle life the strain on muscles and joints begins to tell and body functions may begin to fail. One of the earliest symptoms resulting from poor posture is a sense of fatigue out of all proportion to the work done.[1]

Fatigue is an inevitable and normal result of mental and physical activity, hence a certain amount of fatigue after either work or recreational activities is healthful and desirable. Fatigue is a complex physiological state and results in a feeling of tiredness and a diminished capacity for work. The use of muscles strengthens them and increases their capacity for work. It is interesting to note that fatigue does not occur in the muscle itself but in the nervous structures which direct and control the voluntary muscular contractions.[2] Physiologically, fatigue is characterized by the formation of poisonous waste materials and the depletion of the reserve nutritive material of the cells. Normally the fatigue resulting from a day's activity is repaired by a night's sleep. But if the fatigue is excessive for an extended period it accumulates and a pathological condition results. If mental conflict and montony in addition are present, abnormal states such as brain fag, neurasthenia, and nervous exhaustion are likely to develop.

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[1] This subject is discussed further by F. C. Meredith in *Hygiene, A Textbook for College Students*, pp. 303–320. P. Blakiston's Son and Co., Philadelphia, 1926.

[2] The subject of fatigue is developed further by Nickell and Dorsey, *Management in Family Living*, pp. 76 to 85. John Wiley and Sons, Inc., New York, 1942.

In general, then, to prevent fatigue it is desirable to arrange work centers so that torsal and manual efforts are reduced. The salad center described previously was a work center between a refrigerator and a sink. Its use as a center for preparing salad is probably secondary to other uses, that is, the sink and the surfaces on either side is primarily a place for washing dishes and other processes requiring water. Cutting the apples, the celery, and the walnuts, and mixing and arranging on plates can be comfortably accomplished at a height anywhere near the center of the torso. But washing dishes is a longer and oft repeated activity so that a more exact location has been determined. For the bottom of the sink, which is the lowest point reached in this activity, Wilson, Roberts, and Thayer report that the preferred height of the bottom of the sink which is five inches or more deep is 31 inches from the floor. If the sink is properly set and if it has work counters on each side, as is often the case, the height of these counters is 36 inches from the floor; however, many of the new sinks are six inches or seven inches deep. The counter is then 37 inches or 38 inches from the floor. If the sink is less than five inches deep, the bottom is comfortable at 32½ inches from the floor. In any case, preparing salads, scraping and stacking dishes are comfortably done on the higher counters on either side of the sink, and the washing of dishes is made easy if the sink is the correct height.

Some activities in connection with the preparation of food are not done comfortably at the heights of work counters indicated above. Mixing of doughs and batters and rolling out pastry are done at a height similar to that required for the bottom of the sink or 32 inches to 33½ inches respectively. Obviously, a special lower surface for mixing and rolling of doughs is desirable. This can be accomplished by a substantial pull-out board lower than the high work surface, a table of this height drawn up to storage at a high work surface, or by a built-in cabinet with the work surface at the height needed. An excerpt from a table indicating preferred working heights is shown on this page.

DIMENSIONS SUITED TO THE REQUIREMENTS OF THE AVERAGE HOMEMAKER [1]

PREFERRED HEIGHTS OF WORKING SURFACES, WORKER STANDING

Working Surface	*Inches*
Floor of sink (shallow)	32½
Bottom of sink 5 inches or more deep when the sink drainboard is used as mixing table	31
Mixing table	32
Pull-out pastry board	33½

These figures were arrived at after 562 women were allowed to state their preference for doing this work at different heights.

Formerly body height was regarded as important in determining work heights. The most frequently quoted rules are that the height of the working surface above the floor should be established (a) at one-half the height of the worker, (b) at a point eight inches below the elbow of the worker, or (c) so the worker may stand erect and place palms flat on the surface. More recently Knowles [2] points out that other factors seem to be more fundamental than body height for a comfortable working height. Among these are the length of the arm, the height of the elbow, the abdominal and bust extension, the fullness of the upper arm, and vision (nearsighted or farsighted, or as affected by use of bifocal glasses).

Not only does the height of the work surface affect the posture of the worker, but studies have been made that indicate it is a determining factor in the amount of energy expended with performance of a given task.

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[1] Maud Wilson, Evelyn H. Roberts, and Ruth Thayer, *Standards for Working-Surface Heights and Other Space Units of the Dwelling,* p. 37. Oregon State Agricultural College, Agricultural Experiment Station Bulletin 348, 1937; published also by Washington Agricultural Experiment Station as Bulletin 345.

[2] Eleanor Elaine Knowles, "Relation of Posture to Fatigue in Ironing." *Journal of Home Economics,* vol. 37, No. 9, p. 587, Nov., 1945.

EFFECT OF HEIGHT OF WORK SURFACE ON ENERGY COST[1]

Activity	Average Per Cent Above Resting		
	Low	Medium	High
Beating	54.8	52.0	51.5
Kneading	133.0	119.0	116.0
Ironing napkins	82.2	77.0	70.2
Hanging clothes with basket on the floor	184.0	....	....
Hanging clothes from utility table	....	....	118.0

The preceding table shows that for some activities, such as beating, the height of the work surface makes but little difference in the amount of energy required, but that for others such as kneading, ironing, and hanging up clothes the height of the work surface perceptibly affects the energy requirement.

A study by Knowles, previously referred to, shows that other body functions are disturbed by an unsuitable working height. The caloric requirement, the heart rate, the pulmonary ventilation, and the blood pressure (pulse) were checked when women ironed for three hours at the preferred height of 34 inches and the usual 31 inches or 32 inches for ironing boards found on the market. There was a marked increase in all of these items when the lower height was used, and in addition there was an increase both in the force exerted on the ironing board and in postural shifting.[2] In addition the use of the lower board brought out comments on definitely located pains, aches, or strains in the back, feet, and legs.

Another feature of work centers which affects the amount of energy required for doing a task is the adequate provision for sitting to do certain things. Torsal and pedal efforts are

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[1] Compiled from VeNona W. Swartz, *The Human Energy Cost of Certain Household Tasks.* State College of Washington, Agricultural Experiment Station Bulletin 282, 1933.

[2] Eleanor Elaine Knowles, "Relation of Posture to Fatigue in Ironing," *Journal of Home Economics,* vol. 37, No. 9, pp. 585–586, Nov., 1945.

Courtesy Co-operative Extension Work in Agriculture and Home Economics, State of Nebraska

Sitting to work at the sink can be done when there is provision for placing the knees and feet under the sink.

reduced by such provision. Swartz found that paring potatoes while sitting on a chair with the pan in the lap required energy of 42.8 per cent above resting, and paring potatoes while standing required 50.2 per cent above resting, but sitting on a high stool at which it was not possible to put the knees under the table and which necessitated turning the body at the waist in order to work over the pan on the table required 54.1 per cent of energy above resting.[1] From these figures it would seem that provision for sitting properly for those tasks that permit it is desirable in any work center. The preferred heights of equipment used by workers while seated are reported by Wilson, Roberts, and Thayer for the equipment shown on this page.[2]

EQUIPMENT	INCHES
Kitchen planning desk	25
Mixing table	24
Ironing board	24
Sewing table	24

(Two inches allowed for thickness of table top and clearance above thighs.)

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[1] Reported in VeNona W. Swartz, *The Human Energy Cost of Certain Household Tasks.* State College of Washington, Agricultural Experiment Station Bulletin 282, 1933.

[2] Maud Wilson, Evelyn H. Roberts, and Ruth Thayer, *Standards for Working-Surface Heights and Other Space Units of the Dwelling,* p. 37. Oregon State Agricultural College, Agricultural Experiment Station Bulletin 348, 1937; published also by Washington Agricultural Experiment Station as Bulletin 345.

Instructions to managers in industry often suggest the desirability of provisions to permit alternate sitting and standing at work. Such provision seems equally desirable for the home worker. Too often there is not sufficient provision for sitting to do work in the home kitchen and laundry. If there is a low table or a pull-out lap board, an ordinary kitchen chair can be used. If only high surfaces are available, they should provide a place for the legs and feet of the seated worker under them. A comfortable seat of proper height should be available. Good stools or high chairs have been developed for industry but seem unavailable for home use. Requirements for a good chair are quoted for the industrial worker as follows:

Courtesy Co-operative Extension Work in Agriculture and Home Economics, State of California

A portable lap table makes for comfortable sitting while working.

1. The chair should be adjustable in height so that it may be readily fitted to the particular individual who is to use it. . . . . The chair should be adjusted to a height that permits the worker to sit comfortably with both feet resting on the floor or on the foot rest.
2. The chair should be rigidly built, preferably of steel frame with wood seat and back . . . since wood is more comfortable than metal. The edges of the seat and back should be rounded so that no sharp edges can cause discomfort and impede circulation. Swivel chairs and chairs with casters are not recommended . . . if the work requires some muscular effort. The chair may be provided with smooth metal "sliders." . . .
3. The chair seat shoud be form fitting. A saddle seat permits the

weight of the body to be evenly distributed and so promotes comfort. The front edges of the seat should be well rounded. For normal work the front edge of the chair should be approximately one inch higher than the back edge. . . . .The seat should be of sufficient width to accommodate the body—16 to 17 inches is none too wide; however, the seat should not be over 13 or 14 inches in depth. The shallow seat permits the body to bend at the hip when leaning forward, whereas a deep seat tends to prevent this and to cause the body to bend at the waist line, putting a curve in the spine and disturbing the posture. The deep seat also tends to cut off the circulation of blood through the underside of the thighs near the knee.

4. A back rest should be provided to support the lower part of the spine. To do this the chair should not have a horizontal cross slat or bar lower than six inches above the seat. The body should sit well back on the seat so that the back rest can support the small of the back. The lower edge of the back rest should be six to seven inches above the seat, depending upon the individual. The back rest may be three to four inches wide and 10 to 12 inches broad. The back rest may be small and yet give satisfactory support. It can be so designed that it will not interfere with the movements of the individual's arms while working. It is important that the back rest be adjustable so that it may be fitted to the worker's body. When the worker leans forward while working, the chair back is of no use; however, the worker can use it while resting, and it serves a very valuable purpose in being there for momentary relaxation.[1]

The parts of a work center which most commonly contribute to poor posture include: heights of working surfaces, of work counters or table tops, stove tops, ovens, frequently used shelves and drawers at improper heights; mop, broom, or vacuum cleaner handles of improper lengths; washing and ironing equipment at wrong heights; types and heights of work stools and chairs, unwise choices in equipment used to care for children, or indeed any other equipment placed in such a way as to constantly throw the body out of equilibrium. Before developing any work center it is advisable to try out the heights which seem to allow a good posture and cause as little

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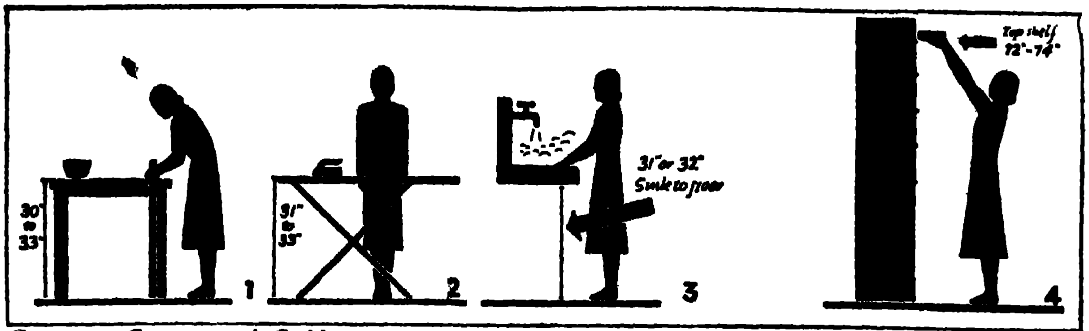
[1] Ralph M. Barnes, *Work Methods Manual*, pp. 118–120. John Wiley and Sons, Inc., New York, 1944.



Courtesy *Consumers' Guide*

To maintain good posture while working adjust each working height to your own. Average heights are represented by these silhouettes. No. 1 is for food preparation tables, No. 2 is for ironing boards, No. 3 is for kitchen sinks, No. 4 is for the highest shelves.

torsal effort as possible for the individual using it. As yet there have not been enough studies on these problems to eliminate the necessity of the experimental approach.

Pedal effort involves walking, moving, and standing. The coming and going incident to the operation of a household require far more time and effort than is commonly realized, and provisions should be made that will minimize the labor of attending to the door, the telephone, and all in the midst of carrying on the various productive activities of the household. "Traffic routes" between the various work centers should be direct and sufficient in space to avoid the feeling of crowdedness.

A study shown on page 344 that demonstrates the saving of time and steps possible by the use of improved equipment and efficient arrangement has been made by Muse. She finds that economy achieved in the meal preparation and clearing away afterwards are demonstrable.

Saving of 2,191 total steps and 1 hr. and 3 min. total daily time, which was achieved by the improved kitchen, is worthy of consideration. Obviously the distance between work centers used simultaneously should be as short as possible.

The minimum width of space between important work centers is 48 inches. Passage between a wall or high furniture and a piece of furniture of less than elbow height requires 21 inches of space, and between a wall and high furniture re-

A cart for transporting the clothesbasket along the clothesline saves energy for the worker. If it is high enough that the worker does not have to stoop, it saves energy in other ways, and is beneficial in preserving good posture.

TIME SPENT AND STEPS TAKEN BY A HOMEMAKER IN MEAL PREPARATION AND IN CLEARING AWAY AFTER MEALS [1]

Preparing and Serving Breakfast		Breakfast Dishes		Preparing and Serving Dinner		Dinner Dishes		Preparing and Serving Supper		Supper Dishes		Total Steps	Total Time	
Min.	Steps	Min.	Steps	Min.	Steps	Min.	Steps	Min.	Steps	Min.	Steps		Hr.	Min.
Original Layout														
33	528	51	702	60	713	39	609	30	472	15	191	3,215	3	49
Rearranged Kitchen														
28	177	36	209	44	239	22	156	27	164	10	79	1,024	2	46

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[1] Marianne Muse, *Kitchen Equipment and Arrangement*, p. 15. Vermont Agricultural Experiment Station Bulletin 375, 1934.

quires 24 inches.[1] In addition all centers located in the work area should be accessible to the main entrance of the house, to the rest area, and to the social area through halls or other "traffic routes."

The inclusion of toe room under every work surface will make pedal effort more comfortable and help in maintaining a good standing posture. This is a feature not always remembered. A space about four inches from front to back and about three inches high will allow for most feet. A work surface that extends in front of the cabinets from three inches to four inches will accomplish the same purpose. The drawers under the surface may be somewhat less accessible when this method is used.

The work about a home requires considerable standing and walking. Foot comfort is enhanced by wearing comfortable shoes with heels broad and low enough to distribute body weight evenly over the foot. Resilient, easily kept floors are an added comfort. Much-used work areas as kitchen and laundry are made more desirable by floor coverings such as linoleum or rubber.

Convenience for the worker is enhanced by the provision of adjacent space of sufficient size and of the right type for the supplies and equipment needed near that center. Storage space must be planned to house within reach of the worker those articles most frequently used, the less accessible places being reserved for articles least frequently used. Cleaning equipment should be stored near places requiring major cleaning work. In general the problem of relating storage space to work centers has two phases; namely, the storage space is inconveniently arranged or it is lacking in amount. However, this problem is considered later.

Suggested Activities

1. Check your own posture as you stand, sit, and work. What changes can you make in your work center for study which will help you maintain good posture?

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[1] Figures quoted from Maud Wilson, *Planning the Willamette Valley Farmhouse, for Family Needs*. Oregon State Agricultural College, Agricultural Experiment Station Bulletin 320, 1933.

2. Determine your own personal measurements for working heights and reaches. Use the tools for rolling with a rolling pin, beating with a rotary beater, washing dishes, ironing, and cutting from a pattern. Try different heights until the optimum height is found. Use a form similar to the following:

I. Activity	First Trial	Second Trial	Average
Rolling			
Beating			
Ironing			
Cutting			
Dishwashing			

II. Reaches

1. What is the highest shelf you can reach with one hand?
2. What is the highest shelf you can reach with two hands?
3. What is the highest shelf you can see without standing on tip toe?

3. What is the lowest drawer you can reach without bending?
4. Make a diagram of your normal and maximum reaches with each hand across and along a work surface of a comfortable height.
5. Analyze some simple job as mixing muffins or applying makeup. Place the tools and supplies needed in the areas of reaches.

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Problem 3. WHAT SPECIAL CONSIDERATION SHALL BE GIVEN TO THE PLANNING OF AN EFFICIENT KITCHEN?

The kitchen is the major part of the work area of the average home. To the extent that it facilitates ease of work, the fatigue incident to carrying on household duties is lessened and the satisfaction of the worker is increased. The diversity of activities that are carried on in it makes the formulation of plans for its efficient arrangement more difficult than is the planning of an efficient work center in a factory. Here, as in a factory, productive activity goes on, but it is vastly more complex. Pickles are made, bread is baked, tomatoes are canned, meat is cooked, and so on through a long list of tasks. Each one of these, if taken over by an outside agency on a mass production scale, would be studied through job analyses by efficiency experts.

Although such detailed analyses of the operations in home

Courtesy The Art Institute of Chicago

Preparation for Thanksgiving in the kitchen of yesterday.

production have not been made, it is commonly accepted that the work pertaining to the storage, preparation, and service of food may be grouped under five different operations, namely, storage, preparation, cooking, serving, and clearing away. This list may be amplified advantageously by the addition of items on planning and shopping and by the division of the work grouped mainly around preparation into its two phases of collecting and preparing. An analysis of the operations and processes involved, as well as a listing of the equipment used, is presented in the table on pages 351 and 352.

The operations of planning and shopping may be carried on in the kitchen if a telephone is available, but usually to some extent they are carried on outside. Frederick early suggested a "comfort corner" in or near the kitchen where in addition to facilities for a short rest and freshening up is a place for the telephone, household account books, bill file, and recipe books.[1] Surely, every home needs a business unit or planning center, and, in many cases, the kitchen is a better place for it than any other part of the house. The need for such a unit is among reasons for planning kitchens larger than the small ones recently in vogue. Sometimes the planning center is incorporated in the dining nook which may also be a part of the kitchen. In this case it becomes a family center, where letters are written, children play games, and informal family councils are held. The telephone, the family bulletin board, and a small radio may be located at this place. In the exceedingly small kitchen where only a small amount of space, such as a drop shelf, is available, provision for such a "corner" might better be made outside the kitchen.

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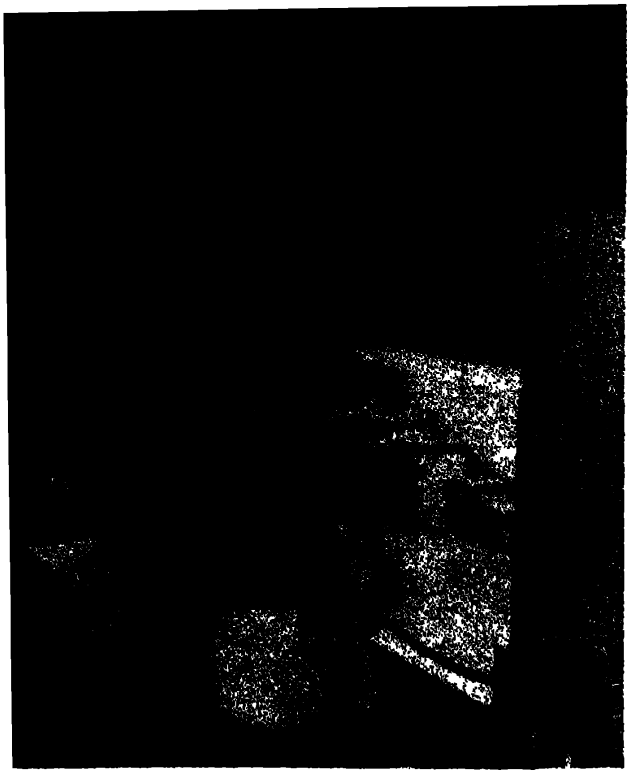
[1] Christine Frederick, *Efficient Housekeeping*. J. B. Lippincott Co., Chicago, 1925.

Ordinarily, most of the shopping done in the kitchen or, in fact, in the house, is by the use of the telephone. An extension telephone in the kitchen is a convenience, but if there can be only one telephone in the house, its location in an entrance hall accessible to the kitchen is recommended.

Courtesy Westinghouse Electric and Manufacturing Co.

A planning desk in the kitchen makes keeping accounts an easy task.

The rest of these operations must, of necessity, be carried on in the kitchen. Provision for them may be made by organizing the kitchen equipment into work centers so that each operation may be carried to completion in its own place, the operations proceeding in orderly sequence. If such is the plan, a good arrangement would include the following centers: the mixing center, the sink center, and the cooking center. Storage is supplied for the necessary items at each center. The basic plan of the kitchen is formed around these centers, but in actual practice they may merge with each other and overlap. The organization of each center is as important as its re-



A mix center featuring refrigerator and built-in oven.

lationship to each of the others. The kitchen will lose some of its step-saving efficiency unless food supplies, utensils, and dishes are grouped and arranged according to use. In any case, the distances traveled between sink, stove, and mixing center should be as short as it is possible to make them and allow for sufficient storage and work counters between.

In homes in which much bread making and pastry making are carried on, it may be found that a work center for mixing is desirable. Such an arrangement makes possible provision of working surfaces of the right height for this activity, which it will be recalled (see Problem 2), differs from that suggested as advisable for the sink and adjacent surfaces. If a mixing center is established, convenient storage facilities must be provided for flour, sugar, and other supplies as well as for the equipment used. The counter for the mixing center should be at least 36 inches long, but 48 to 60 inches may be preferable. If this center is on the same wall as the sink, it should be at the right of the sink. Because of the close relationship between mixing and baking it is often near the range.

The refrigerator is the storage space for perishable foods. The refrigerator door should open away from the mixing center. On the counter space near the refrigerator, perishable and staple foods may be worked upon together, as in the making of salads and fruit desserts. The same place or another near the refrigerator might also be suitable for the mixing of doughs and batters. In that case it is convenient to place staple foods, spices, extracts, flavoring, and others in wall cabinets above the counter. Pull boards of various lengths should extend the full length of the counter. These may be a kneading board, a cutting board, and a board for the food chopper. Below the counter space a common arrangement is to have in the partitioned top drawer mixing and cutting utensils. In metal-lined deep drawers below this are flour, sugar, or bread. Because of the difficulty of filling them, wall cabinets containing bins for large amounts of flour and sugar with sifters are being replaced by the lower bins or drawers without built-in sifters. Baking dishes, pots, and pans should be stored near this place, also. If utensils or supplies are used equally at two different centers there should be a set for each point, as a supply of salt, forks, spoons, and spatulas should be available at both the preparation counter and the range.

The sink is the place of first use for a number of operations, and near it utensils and supplies needed should be conveniently provided. Dishwashing is done there, hence the dishwashing equipment and supplies should be kept there. If space permits, a bin for root vegetables is convenient at this point. Cutlery and cutting boards should be here also. Ventilation in the drawer or doors is important. If the worker is right-handed, storage of china in wall cabinets to the left of the sink is generally recommended. Under the counter storage to the left of the sink could be utilized for supplies and equipment not in constant use, such as canned goods, large roasters, pressure cookers, and others. Higher drawers may house silver and dish towels. There may be space for the storage of trays here.

Work surfaces should be provided on each side of the sink. A counter about 36 inches long at the right of the sink is usually adequate for stacking soiled dishes, and one 32 inches long at the left is sufficient to place clean dishes. Both of these counters are available for use in the preparation of fruits and vegetables. A pull-out lap table can be provided at either side of the sink for working while seated, or the cabinet doors may be opened to permit room for the knees while working seated at the sink. Mechanical dishwashers and garbage disposal as a part of the sink may be installed in this area.

ANALYSIS OF OPERATIONS CONNECTED WITH FOOD PREPARATION AND THE EQUIPMENT AND SUPPLIES USED TO PERFORM THE OPERATION

Operation	Processes Included in the Operation	Equipment Used	Supplies Used
Planning..........	Planning the menus and adapting them to the budget; keeping account records. May or may not be done in kitchen.	Planning desk, chair, writing supplies as ink, pen, paper, recipe book, account book.	Ink Paper Pen
Shopping for or otherwise obtaining food supplies...	Shopping in person at stores, markets, or stands. Ordering over telephone. Gathering from family or truck gardens. With the exception of the second item none of these can be done in the kitchen.	Telephone, possibly as a part of the planning desk. Other activities are carried on outside the kitchen.	
Receiving and storing of food supplies............	Receiving goods delivered or carried home, or gathered from gardens. Storing at proper temperature and humidity and in proper receptacles until needed.	Work counter for receiving goods delivered, carried home, or gathered from gardens. Refrigerated storage, Mechanical or ice refrigerator Cold cellar or cave Window cold box or cooler Receptacles Cans Jars Dishes Shelves Hooks Bins Drawers	Fruits Vegetables Groceries Water
Collecting.........	Collecting from storage raw material and equipment needed for preparing and cooking food.	Work counter Trays, either hand or wheeled Measuring utensils Receptacles	
Preparing fruits and vegetables........	Washing Paring Cutting Soaking Grating Grinding Slicing Measuring	Sink with supply of hot and cold water. Work surface Paring knives Vegetable brushes Scissors Garbage can Measuring cups Vegetable slicers and graters Sauce pans Double boiler Can opener	Fruits Vegetables Canned goods Water

Operation	Processes Included in the Operation	Equipment Used	Supplies Used
Preparing breads, desserts, or casserole dishes......	Measuring Stirring Beating Kneading Rolling Grating Grinding	Recipes Work counter Mixing bowls Measuring spoons Measuring cups Beaters Blenders Mixing spoons Food chopper Dough boards Rolling pins Pudding pans Baking dishes Cutting board Bread knife Freezing container Oven cookery Roasters Loaf pans Cake pans Pie pans Cookie sheets	Sugar Flour Staples Seasonings Eggs Milk Butter Cream Leavening agents Flavoring
Cooking and serving........	Cooking by all methods, frying, stewing, baking, boiling, roasting, steaming.	Ranges of all kinds Electric appliances Coffee makers Toasters Deep fat fryers Skillets Waffle irons Sandwich grill Others Top of range Sauce pans Kettles Double boilers Steamers Pressure cookers Skillets Griddles Frying pan Deep fat fryers Hot lifters Cutlery Spoons Lids Spatulas Ladles Turners Masher Forks Coffee pots Teapots Teakettle Thermometers Oven Meat Candy	Coffee Tea Salt Pepper Drippings Uncooked breakfast cereals Matches Water

Continued on page 354.

ANALYSIS OF OPERATIONS CONNECTED WITH FOOD PREPARATION AND THE EQUIPMENT AND SUPPLIES USED TO PERFORM THE OPERATION—CONTINUED

OPERATION	PROCESSES INCLUDED IN THE OPERATION	EQUIPMENT USED		SUPPLIES USED
Cooking and serving (*continued*)	Removing food from cooking or freezing utensils and placing in serving dishes. Carrying food in serving dishes to the table.	Work counter Hot lifters Cutlery Spoons Turners Forks Knives	Table appointments Trays	Platters Bowls Individual dishes
Clearing away and storage*	Removing soiled dishes from dining area. Scraping, rinsing, stacking dishes and cooking utensils. Washing, scalding, drying dishes and cooking utensils. Storage of dishes and cooking utensils. Disposal of garbage. Cleaning of floor and work counters.	Rubber scraper Trays, either hand or wheeled Supply of hot and cold water For washing by hand Stack surface Sink Draining surface Dish pan, if used Drainer Dish towels Dish cloth or mop For dish washing machine Stack surface Dish washer	Garbage disposal Sink strainer Garbage can or incinerator Garbage disposer Newspapers Storage Shelves Drawers Hooks Racks	Soaps Cleaning powders Metal sponge Silver polish Paper towels

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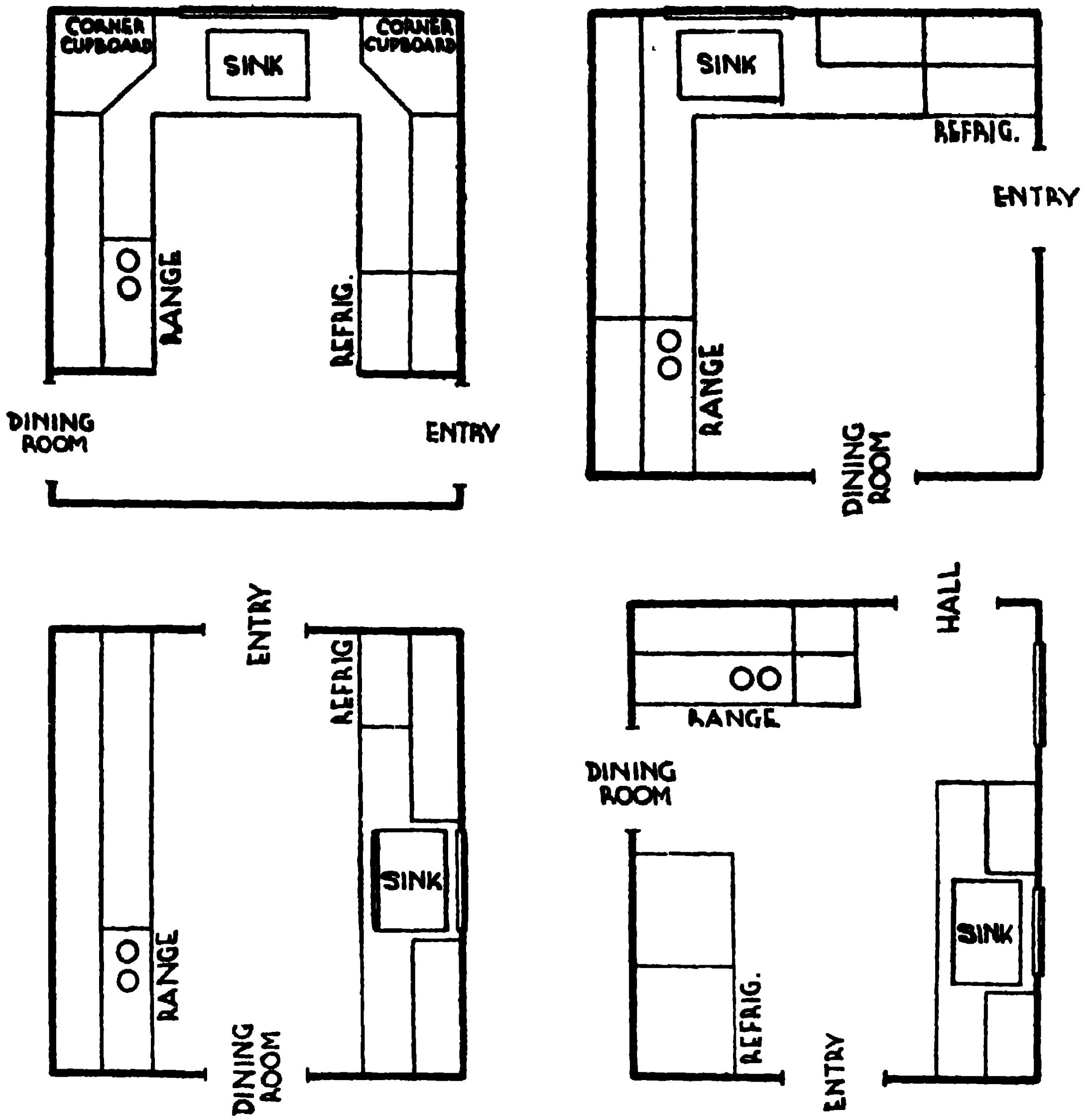
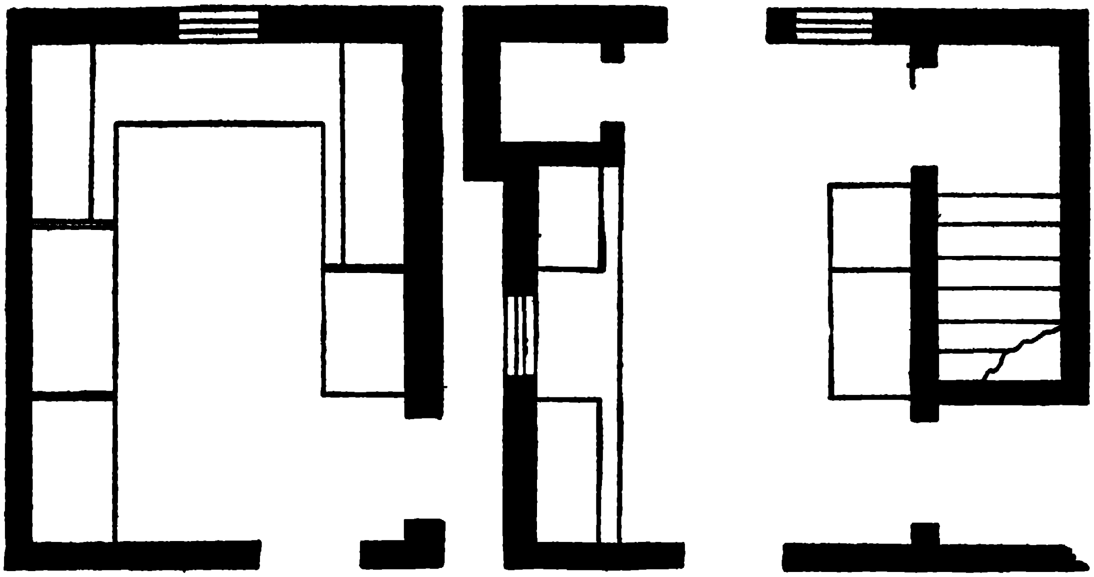
* This is the same space required for the preparation of fruits and vegetables.



Kitchens should be compactly arranged. Such arrangement may take several different shapes, depending upon the location of the openings. *Upper left,* a U-shaped kitchen; upper *right,* an L shaped kitchen; *lower left,* a 2-wall kitchen; *lower right,* a separate unit kitchen.

The cooking center is designed for all kinds of cooking and serving hot foods. It should be not far from the mixing and sink centers, and it should be convenient to the dining area. The range is the main piece of equipment in this center. If the range is wood- or coal-burning, space must be allowed for safety from heat, to make cleaning easy, and for storage of fuel. A work surface on one or both sides is a convenience.

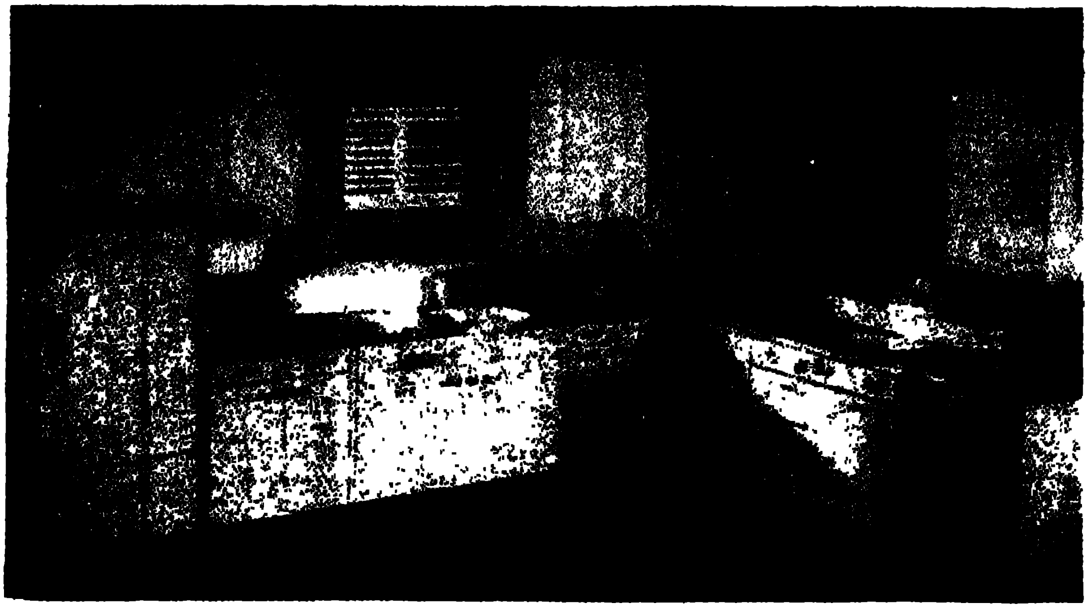


The amount of wall space free for placing equipment in the kitchen is determined by the number of openings, such as doors and windows, and the amount of traffic through the kitchen depends upon the placement of the doors. Note that in the kitchen at the left the wall spaces are free for equipment and the doors are so placed that the traffic through the kitchen will be limited. In the kitchen at the right the wall spaces are taken up by doors which are so placed that the traffic through the kitchen will be extensive.

If possible, frying pans or other utensils needing preheating as well as some cutlery should be stored near the range. For this purpose a full height cabinet reaching from the floor to the top of wall cabinets may be provided. Shelves may be included here for pans and supplies used in cooking which does not require water. Hooks for hanging handled utensils and racks for lids may be provided.

Recommendations as to whether storage of small equipment shall be enclosed behind doors, in drawers, or hung out at the points where they are used, seem to vary with the source; however, it is less costly to build cupboards without enclosing the shelves. East of the Mississippi River research workers may praise the open arrangement, but in many Middle Western sections the occurrence of dust storms requires that everything be placed under cover.

The arrangement of the equipment into work centers pos-

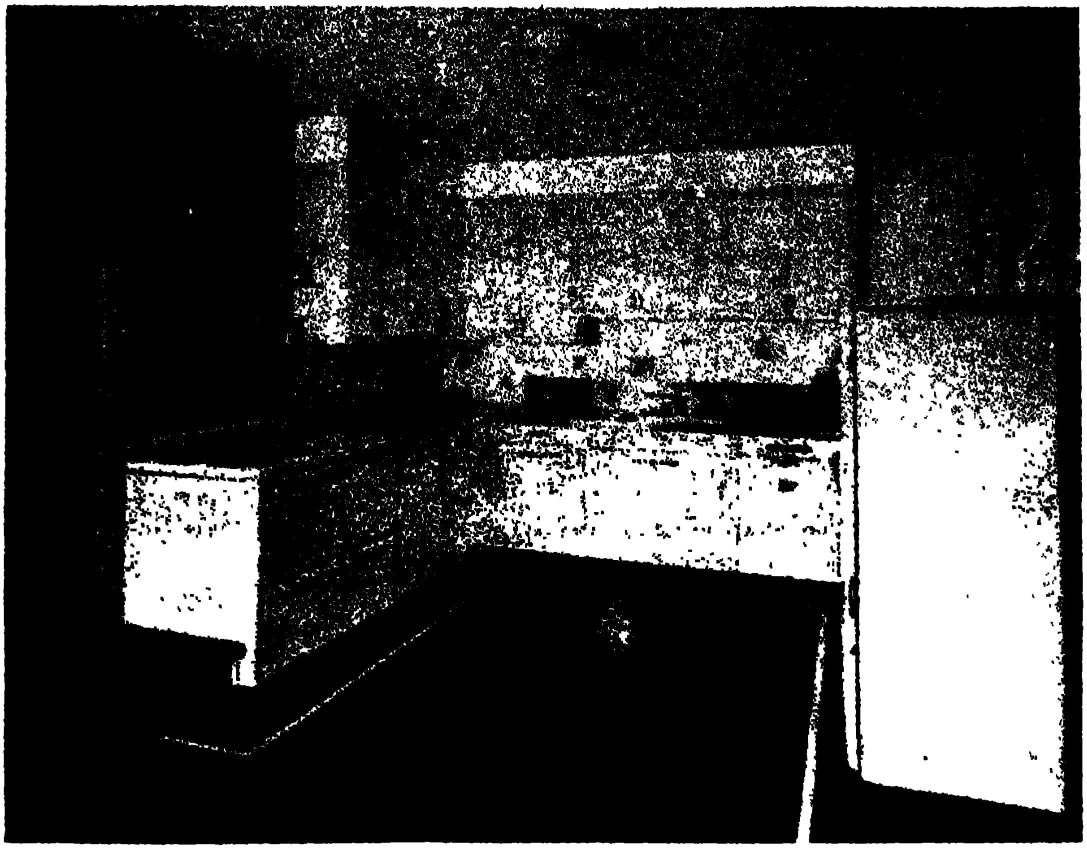


Courtesy The International Nickel Co., Inc.

An L-shaped arrangement of large equipment.

sible in any kitchen is affected somewhat by the shape of the kitchen and by the location of the openings. A rectangular-shaped kitchen is usually most economical of space; however, a square may be used. In either case the equipment may be organized in a U-plan, an L-plan, a two-wall or a corridor plan, or a one-wall plan. In a U-plan, three walls are left clear for equipment with the sills of windows 44 to 48 inches from the floor to accommodate base cabinets with splashbacks. The L-plan leaves free two walls for placing equipment. In some cases the position of the openings necessitates breaking the ends of the above mentioned U- and L-plans, thus making a two-wall or corridor arrangement. When a square kitchen must be used, or it is desired to break up the space in a large rectangular kitchen, it is possible to extend some of the work equipment at right angles to a wall and thus apparently to extend the length of the wall. This may result in bringing some of the centers closer together and at the same time segregate some other activity from the main work area.

The wall kitchen is sometimes planned for small apartments in which one or more adults prepare only simple meals. A minimum amount of small-sized equipment is arranged along a wall, usually of the living room, and is separated



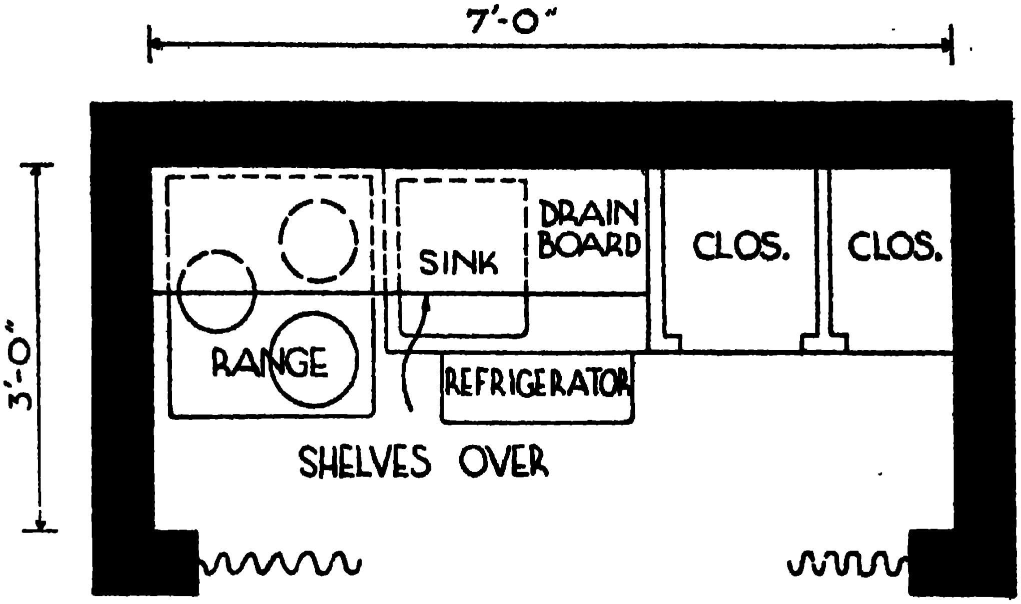
Hotpoint electric equipment featured courtesy Edison General Electric Appliance Co.

A kitchen with U-shaped arrangement of large equipment.

from it by sliding or folding doors. Wall kitchens are recommended only where the greatest economy of space is necessary.

Among the means suggested for providing desired relationships between centers is the use of a table on wheels. This may be used to gather equipment and supplies and transfer them from one center to another with a minimum of walking, and may also serve to extend working surfaces in the different centers.

The number of openings in a kitchen limits the amount of wall space free for placing equipment. Doors to the kitchen should be limited to two in number, and these with any other necessary doors should preferably be at one end of the room. Doors should swing against unused wall spaces to avoid inconvenience at the work centers. Traffic not required for food storage, preparation, or service should be segregated from the kitchen work area. Arrangement of the service entrance should route traffic to other parts of the house away from this



Wall kitchen plan.

work area. Windows should be sufficient in number and so located that natural light and a good view are furnished. Easy-to-get-at wall cabinets and windows compete with each other for wall space, with the wall cabinets on the winning side. There has been some attempt to solve this problem by putting glass between the cabinets and the work surface and above the cabinets. Other plans take all the wall cabinets from a main window wall and provide for a storage wall convenient to centers elsewhere. Careful arrangement of windows and doors should result in cross ventilation which supplies abundant fresh air and carries off excess heat and odors. When such provision is not possible, economical exhaust fans are available. The fan can be located above the range and connected to the outside through a fireproof duct. A fan will not only provide circulation of air but will remove odors and excess vapor or humidity. It is known that much of the soil deposited over the kitchen walls is due to excess greasy vapor.

The size of the kitchen is dependent upon several factors, among which are the available space in the house plan, the number of persons normally living and eating daily in the house, the amount and kind of entertaining usually carried on and the provisions which must be made for it, the kind of fixtures desired, and the activities other than those associated with the preparation of food which must be carried on in the kitchen. There has been some suggestion that in a one-family dwelling the kitchen might take up no less than about nine per cent of the floor space of the house. The floor plan should provide adequately for the major operations to be carried on in the kitchen. The minimum amount of linear wall space given to the usual work centers is shown on this page.

Storage and preparation	58 in. to 70 in.
Preparation and sink centers	64 “ to 82 “
Mixing center	36 “ to 60 “
Cooking and serving center	60 “ to 70 “

Other desirable measurements to keep in mind include:

Space for standing, 1 person (lateral)	18 in.
Space for standing, 2 persons back to back between equipment	48 in.
Space for working (lateral)	24 in. to 30 in.
Space for stooping for objects	36 in.
Space between large pieces of equipment side by side (to make it possible to clean between them)	4 in. to 6 in.
Maximum floor space between working units	60 in.
Space between sink drainboard and wall cabinet above	15 in.
Space between mixing table and wall cabinet above (to provide for placing a food mixer under)	17 in.
Width of most base cabinets (front to back)	22 in.
Depth of wall cupboard above sink	6 in.

The dimensions of a kitchen are important. The lowest minimum width of a kitchen having equipment arranged on both sides is six and a half feet, with seven and a half to eight and a half feet being far better. In one-family dwellings the size of kitchens is classified as:

Small kitchen	8′x10′ to 10′x10′
Medium kitchen	10′x10′ to 10′x12′
Large kitchen	10′x12′ and over

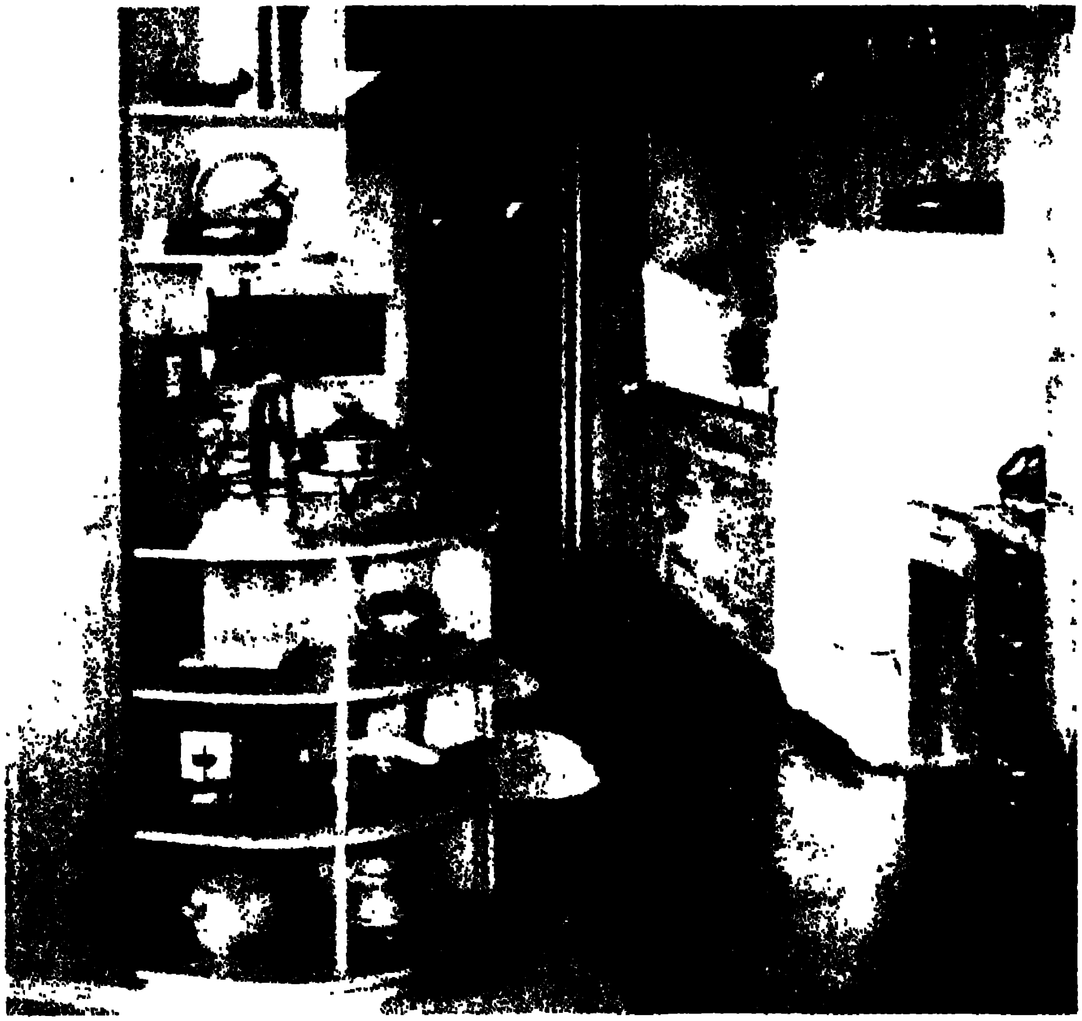
The kitchen should be large enough to permit persons to pass easily between stationary or built-in equipment, to allow sufficient circulation of air to carry off the heat of preparing meals, to allow shelf room and counter space sufficient that constant rearranging of contents is unnecessary, and in homes where there are small children to allow space for them to work with the mother. If other productive activities, such as laundering or the care of milk or poultry production, are carried on in the kitchen its size will need to be increased and provision of a work center for these processes be made in the plan for the room.

There are many good manufactured and mill-made kitchen cabinets available on the market. These come in either wood or metal and are in "stock" or standardized sizes. They are assembled or ready to assemble and usually provide more economical storage space of good quality than can be custom-built.

Several points deserve consideration in the selection of a cabinet. Wall cabinets built to the ceiling or furred in above the height of usability prevent dust accumulating on top. Flush drawers and doors without paneling make for ease in cleaning. When two doors come together in one cabinet, the center jamb should be omitted. All shelves should be adjustable in height or easily pulled out. Waste space between drawers should be avoided. One inch is sufficient for the lintel or horizontal boards between drawers. Only streamlined hardware should be used. Handles should be placed within easy reach instead of always being placed in the center of the door or drawer.

Whatever the shape and size of the kitchen, an analysis of the processes required in the work done there, followed by a listing of the equipment required for it, and a shifting of these on a chart drawn to scale is necessary. Routing between centers to check the amount of walking necessary is desirable before permanent arrangements are made or extensive remodeling is undertaken.

Nonworking areas should be segregated from the working areas in the kitchen proper. This applies to dining nooks,



A two-wall kitchen extends from family room and opens into dining room.

to closets devoted to the storage of cleaning implements and other equipment not used in the kitchen, to rest areas for the homemaker or servants, to play space for the children, and to planning desks. As has been previously stated, the kitchen should be easily accessible to the dining area and other service parts of the house. It should be possible to reach the front entrance and the rest area of the house without traversing long distances. The kitchen should be closely related to the outside service area and should give a pleasant outlook from its windows as this aids in maintaining the housewife's morale. When the "open" type of planning is used, wherein the space for the equipment for doing the work of the kitchen is not partitioned from the living area, arrangement of work centers and their segregation from the living area are important.

Floors, walls, work counters, and the surfaces of storage places in the kitchen should be of materials and finishes easy to clean and easy to keep clean. For the floor, rubber tile is beautiful, resilient, and keeps its finish well, but it tends to be slippery and is expensive. Asphalt and ceramic tiles are less expensive, withstand dampness, but are hard underfoot. Linoleums are resilient, attractive, and can be had in qualities to suit most purses. For walls, often a wainscoting or a splashback of washable material of a permanent nature which requires no upkeep, such as ceramic or asphalt base tiles, micarta, formica, glass bricks or tile, or wall linoleum is desirable. Other less expensive materials, such as paint or washable wall paper, may be used. Regardless of the material used, variegated or marbleized patterns require less care than plain colors. Some decorators are attempting to get away from the appearance of a workshop by incorporating more natural wood finishes and soft colors. For work counters, materials recommended are those which resist acid stains, withstand heat, and at the same time are easily cleaned. These include monel metal, stainless steel, acid-resisting porcelain enamel, tile, linoleum, processed pressed wood and oiled maple. Mouldings for facing the counter edge should be of some material which does not mark the clothing of the person working there.

Artificial light from filament bulb fixtures or from quick starting fluorescent tubes should be provided by central fixtures for general illumination. Auxiliary local lighting on the wall or in the ceiling directly above each work center will facilitate the work, reduce fatigue, and eliminate some of the causes of accidents. Recommended values of illumination for the kitchen are 10 foot candles for general illumination and 40 foot candles for local lighting. Where important entrances are more than 10 feet apart, the central lighting fixture should be multiple-controlled by conveniently placed switches.

Suggested Activities

1. Analyze the problem and list the processes involved in preparing, serving, and clearing away a simple meal common to your family. What large and small equipment is necessary to perform these processes?
2. Using a convenient scale, as 1 inch to the foot, draw a floor plan of a kitchen. By the use of templets drawn to the same scale, arrange large equipment in a convenient plan. Check the efficiency of the plan by drawing the routing for the meal analyzed in 1. Paste the templets down when you have arrived at the best solution.
3. Plan the elevation of the centers based on the supplies and utensils in common use there.
4. Indicate color schemes, finishes, and other decorations that you find suitable.

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Problem 4. HOW CAN AN EFFICIENT LAUNDRY AND WORK AREA BE PLANNED?

As many of the processes once carried on in the home are now delegated to outside agencies, so the laundry, once accomplished by use of washboard and brass kettle, is being increasingly handled by the commercial laundry. However, survey of the situation shows that a considerable proportion of laundry is still done in the home. An early report from the Bureau of Home Economics survey of homes is summarized as follows: [1]

1. A member of the family does the laundering at home in the majority of families in all communities.
2. The larger the community, the smaller is the proportion of homes where the laundry is done by a member of the family.
3. In cities over 100,000, a larger proportion send their flat work to the power laundry.
4. Excluding the farm home, there seems to be a very definite relation between the size of the family income and the type of laundry service used. As the income increases, the family relinquishes the laundry to a paid worker or the power laundry, except for silk things. In the very highest income groups, there is a paid worker in the home.

A Kansas study further substantiates these findings. Of the 188 families studied, 167 or 89 per cent did all of the washing at home, and 21 families or 11 per cent sent all or part of their washing out.[2]

A Good Housekeeping [3] report based on over 1900 returned questionnaires shows that washing is done by family members

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[1] "Bureau of Home Economics Survey of Homes," *The Forecast,* vol. 37, p. 187, March, 1929.

[2] Ellen Lindstrom, *The Cost of Laundry in 188 Kansas Homes,* Unpublished Master's Thesis, Kansas State College, 1937.

[3] Product Use and Development Division, *Consumer Panel Survey Report on Home Laundering,* p. 15. Good Housekeeping, 1944.

Courtesy Bendix Home Appliances, Inc.

The laundry may be located in the garage.

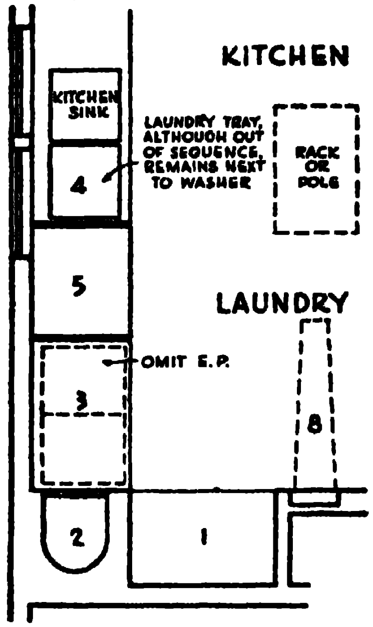
in 71.3 per cent of cases, part is sent to the laundry by 30.5 per cent, all is sent to the laundry by 2.5 per cent, and a laundry woman does it in 10.1 per cent of the cases. Because of these and other studies from various parts of the country, it would seem that planning a place to do the laundry is an essential part of home planning.

The location of the laundry room or the space where laundering is done varies widely. The best location is naturally convenient to other work centers such as the kitchen and to the drying yard. In the house of the woman who does her own work and who has children to supervise, it is an advantage to have the laundry on the first floor because constant going up and down stairs can then be eliminated. Some suggestion has been made of a room off the kitchen to be called a "clothery" with provisions for washing and ironing and for mending and constructing clothing, shining shoes, pursuing some kinds of hobbies, storing the home freezer, a playroom for children, and other activities requiring an easily cleaned space. Other names for such a room include work room and utility room.

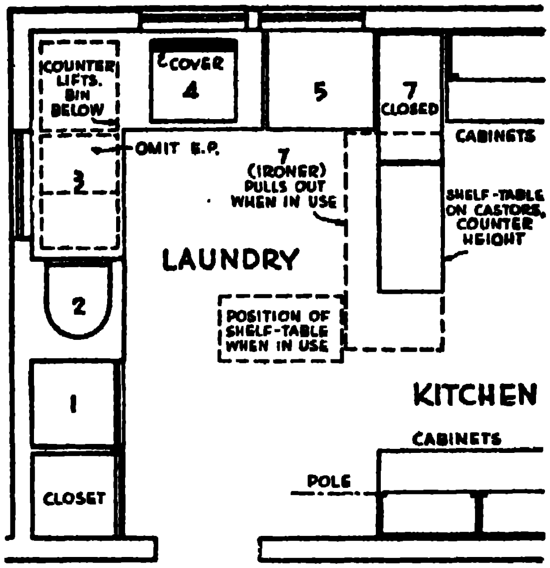
In the farm home this utility room would also provide for men washing and storing their wraps, and for other secondary activities related to the home such as food preservation, washing vegetables fresh from the garden. In the farm home the location of the laundry is determined by the location of the water supply. If there is running water the kitchen or the utility room is used; if the water must be carried into the house then a porch or some outbuilding near the water supply is used. In fact, utility porches, both open and enclosed, used for laundry work, are a common feature of house plans in many parts of the country.

Scale ¼" = 1'0"

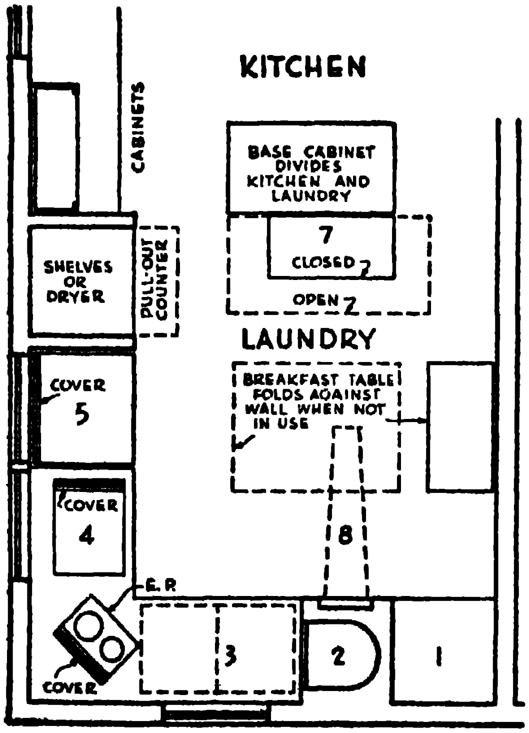
Larch C. Renshaw, A.I.A.


KITCHEN
KITCHEN SINK
4
LAUNDRY TRAY, ALTHOUGH OUT OF SEQUENCE, REMAINS NEXT TO WASHER
RACK OR POLE
5
LAUNDRY
OMIT E.P.
3
8
2
1

A. AT ONE CORNER OF KITCHEN
MINIMUM


COUNTER LIFTS. BIN BELOW
COVER
4
5
7 CLOSED
CABINETS
OMIT E.P.
3
7 (IRONER) PULLS OUT WHEN IN USE
SHELF-TABLE ON CASTORS, COUNTER HEIGHT
LAUNDRY
2
POSITION OF SHELF-TABLE WHEN IN USE
KITCHEN
1
CABINETS
POLE
CLOSET

B AT ONE END OF KITCHEN
COMPLETE EXCEPT FOR DRYER. NEEDS NO ELECTRIC PLATE BECAUSE KITCHEN IS NEAR.
ADEQUATE OR MEDIUM



Courtesy *Architectural Record*

◆ C. AT ONE END OF KITCHEN
IMPROVED VARIATION

KEY

1. STORAGE CLOSET
2. CLOTHES CHUTE (VENTILATED)
3. SORTING SHELF EQUIPPED WITH ELECTRIC PLATE; VENTILATED BINS BELOW.
4. LAUNDRY TRAY WITH MIXING FAUCET AND COVER
5. WASHING MACHINE
6. DRYER (SHOULD BE VENTILATED)
7. IRONER
8. ELECTRIC IRON AND IRONING BOARD

NOTES

INDICATIONS ON PLANS PROVIDE FOR THE USUAL FLOOR SPACE REQUIREMENTS. EACH PIECE FITS INTO A SEQUENCE WHICH WILL MOST NEARLY ACCOMPLISH A "PRODUCTION LINE" EFFICIENCY IN HOME LAUNDRY WORK.

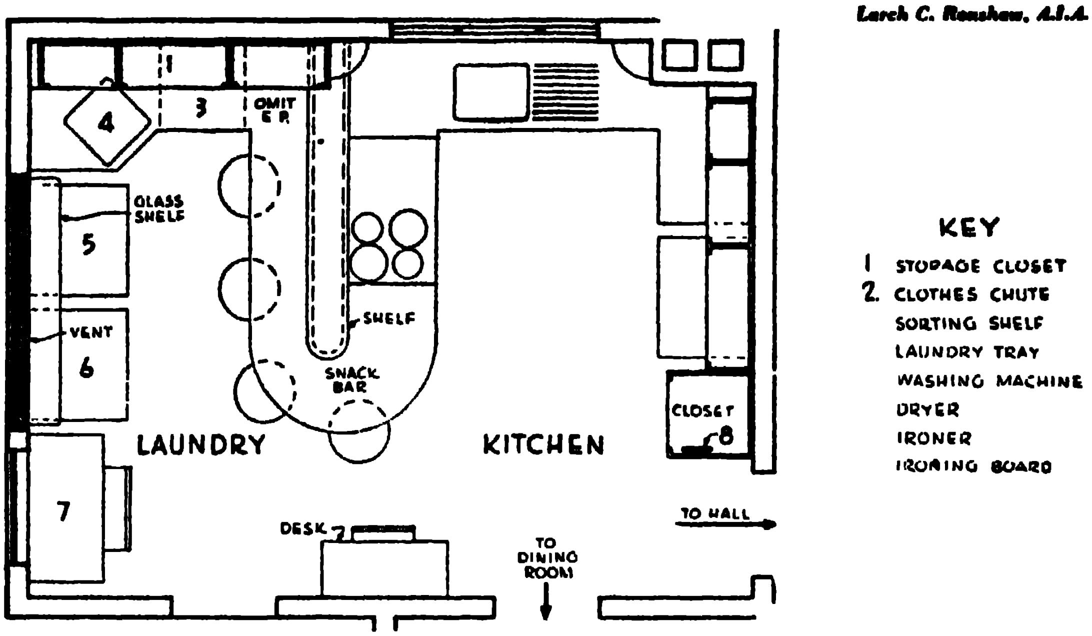
E.P. = ELECTRIC PLATE.

CHUTE EMPTIES ONTO SORTING SHELF OR INTO A BASE CABINET ADJACENT TO A BIN BELOW THE SHELF

THE HOUSEHOLD LAUNDRY

A Kitchen-Laundry Plan

Larch C. Renshaw, A.I.A.



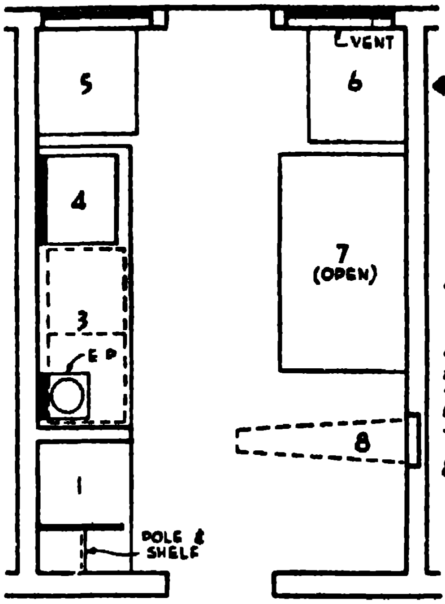
D. COMPLETE KITCHEN AND LAUNDRY LAYOUT
Courtesy *Architectural Record*

The urban home has traditionally had a basement, a portion of which is used for laundry work if running water and a drain are available; however, there is a tendency for houses to be built without basements. If laundry is to be done in the house, provision must then be made some place above ground for it. A special laundry room, an extension of the kitchen, a utility or work room previously mentioned, a part of the garage or some other provision is made. For low-cost housing or in houses exceedingly limited in space it is supposed that, generally, the kitchen will provide for the laundry work. To facilitate work in such situations the installation of a combination sink and laundry tray or possibly a built-in washing machine is advised. The inclusion of the automatic washers makes possible laundry activity in almost any room where hot and cold running water and a sewer attachment are available. The bathroom is beginning to be used for this purpose.

In multiple-family dwellings, particularly where space must be conserved, a covered laundry tray and kitchen sink are installed together. In others a special room equipped with

Scale ¼" = 1'0"

Larch C. Renshaw, A.I.A

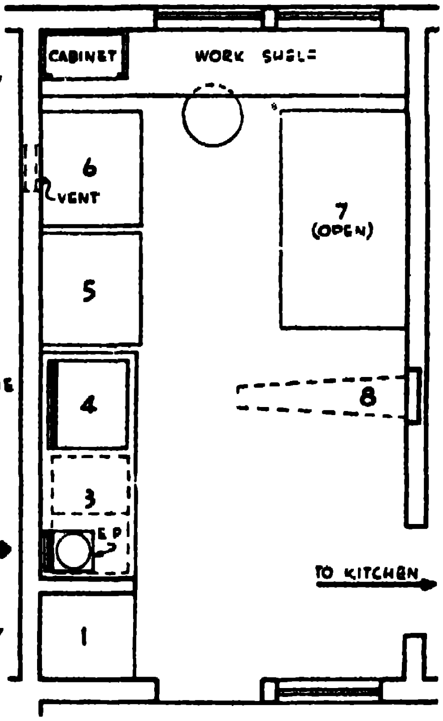


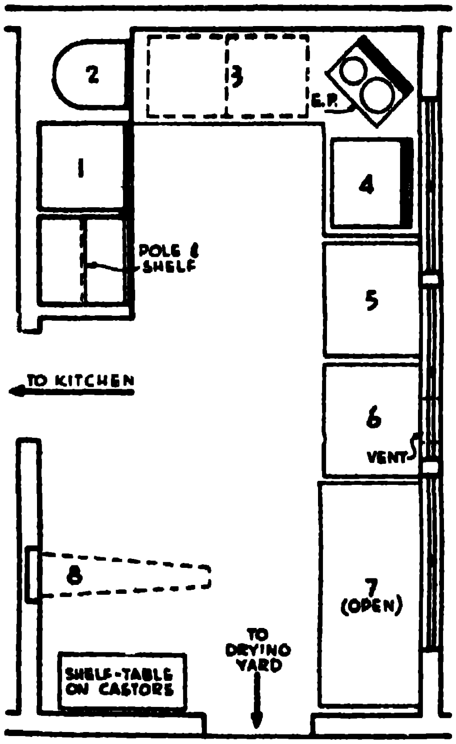
E REAR ENTRY THROUGH LAUNDRY

KEY

1 STORAGE CLOSET
2 CLOTHES CHUTE
3 SORTING SHELF
4 LAUNDRY TRAY
5 WASHING MACHINE
6 DRYER
7 IRONER
8 IRONING BOARD

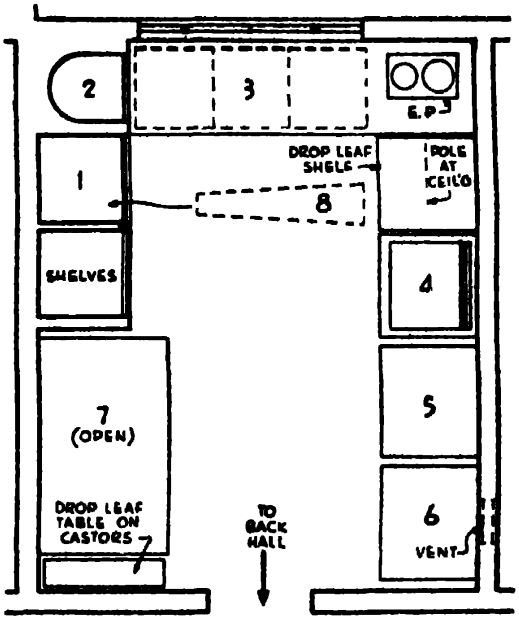
F REAR ENTRY THROUGH ONE CORNER OF LAUNDRY





G. NO REAR ENTRY THROUGH LAUNDRY
BETTER PRODUCTION LINE

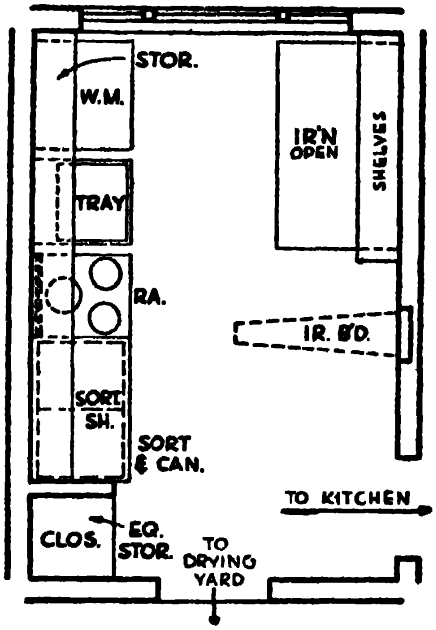
Courtesy *Architectural Record*



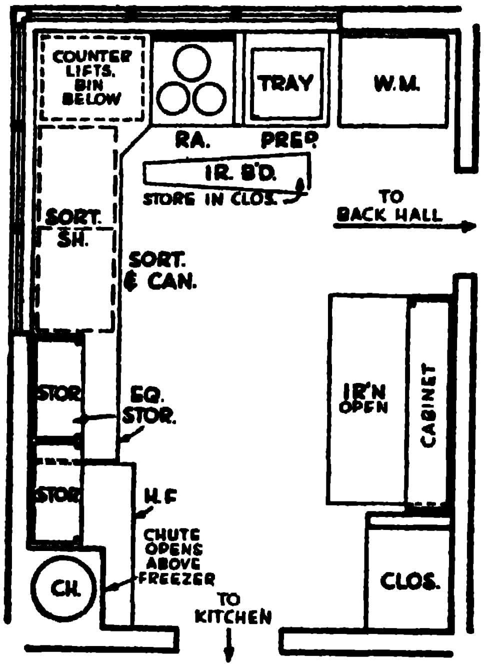
H NO THOROUGHFARE
COMPLETE PRODUCTION LINE

Lorch C. Renshaw, A.I.A.

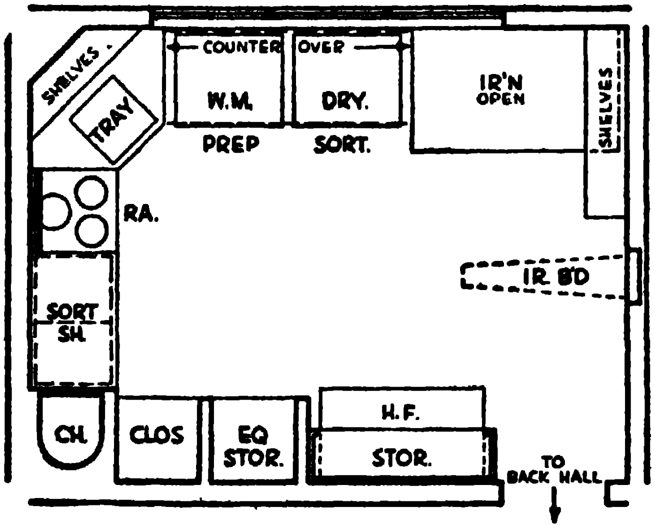
Scale ¼" = 1'0"



I. MINIMUM
NO FREEZER, NO DRYER, NO CHUTE



J. MEDIUM
NO DRYER



K. LARGER

KEY FOR LAUNDRY

CLOS.	STORAGE CLOSET
CH.	CLOTHES CHUTE
SORT. SH.	SORTING SHELF
TRAY	LAUNDRY TRAY
W. M.	WASHING MACHINE
DRY.	DRYER
IR'N	IRONER
IR B'D	IRONING BOARD

KEY FOR CANNING - FREEZING

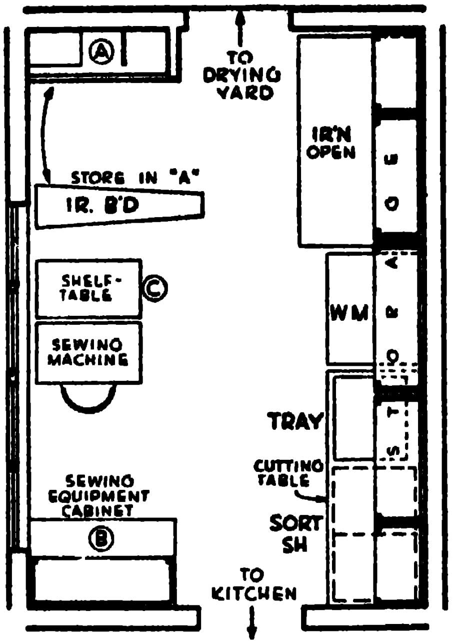
EQ. STOR.	CANNING EQUIPMENT STORAGE
SORT.	SORTING
PREP.	PREPARATION
RA.	RANGE (WITH COVER)
CAN.	CANNING & PACKAGING
H. F.	HOME FREEZER
STOR.	STORAGE FOR CANNED FOOD

LAUNDRY - CANNING - FREEZING

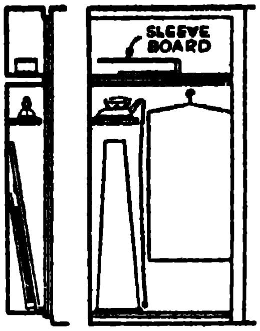
Courtesy *Architectural Record*

Scale ¼" = 1'0"

Larch C. Renshaw, A.I.A.

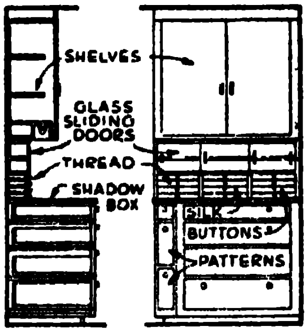


L WALK-THROUGH
LAUNDRY-SEWING-MENDING



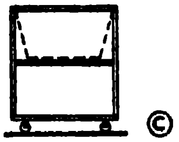
SEC Ⓐ ELEVATION

WASH BOARD MAY BE HUNG ON THE INSIDE OF ONE DOOR



SEC Ⓑ ELEVATION

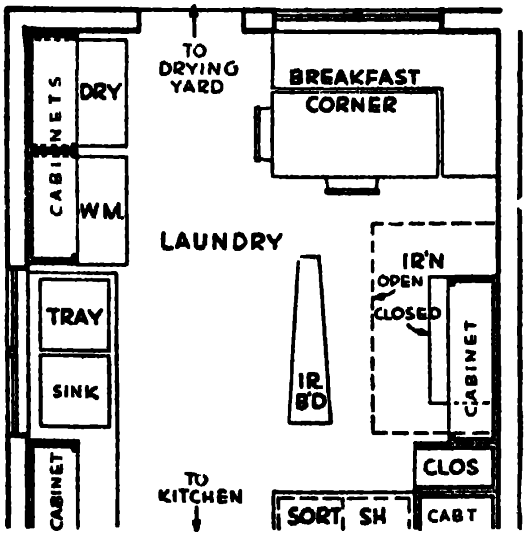
WALL AND BASE CABINETS ARE STOCK TYPES WITH SHADOW BOX ADDED IF SPECIALLY BUILT, CAN BE PORTABLE



UNIT MAY CARRY CLOTHES BASKET IF TOP SHELF IS REMOVED

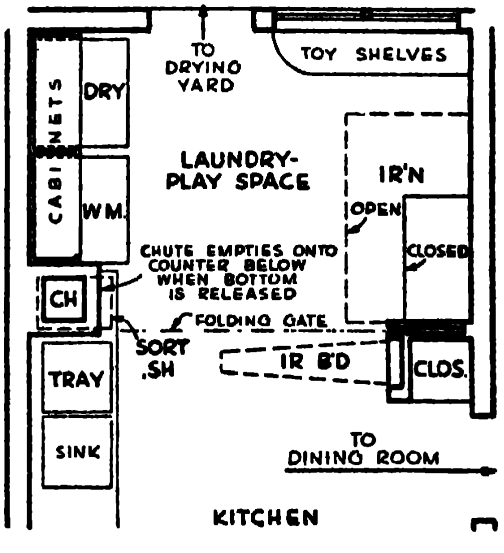
KEY

CLOS	STORAGE CLOSET
CH	CLOTHES CHUTE
SORT SH	SORTING SHELF
TRAY	LAUNDRY TRAY
WM	WASHING MACHINE
DRY	DRYER
IR'N	IRONER
IR B'D	IRONING BOARD



M AT ONE END OF KITCHEN
LAUNDRY-BREAKFAST CORNER

Courtesy *Architectural Record*



N ALTERNATIVE USE
LAUNDRY-PLAY SPACE

trays, a washing machine, and drying space is used in rotation by the occupants of the multiple-family dwelling. It is more pleasant in the rest of the house if the laundry room can be so situated that soap-suds odors do not waft to it.

In addition to the laundry room, facilities for drying clothes are also important. The single-family dwelling, regardless of what section of the country it is located in, will usually have a yard around it wherein lines may be stretched and clothes dried in the open air and sunshine. In most parts of the country a satisfactory indoor drying space is also desired. The multiple-family dwelling will usually afford roof space or some type of indoor drying room which will be satisfactory if it is clean and dry. A satisfactory clothesline is one that is clean, taut, the right height (6 feet is about right for the average woman to reach), and long enough to dry all the clothes at the same time. Some home laundry rooms in humid climates or congested areas have heated and ventilated drying chambers which dry clothes readily. In cities where considerable coal soot and dirt saturate the air, clothes can be damaged by grime and acid gases, hence an indoor drying chamber is an advantage there also.

Wherever the laundry room is located it should have several windows for ventilation and lighting. A good, smooth, dry floor is a comfort. Overhead, diffused artificial lighting is desirable for dark days. Walls that are painted or whitewashed are a cheery influence.

The kind and amount of laundry equipment needed depend upon the nature and amount of laundry work to be done, the funds available for laundry, the power available, and to some extent the water supply. If only a small amount of slightly soiled clothing is to be washed in the home, perhaps laundry equipment might well be limited to tubs and irons even for the high-income home. On the other hand, if much heavily soiled clothing must be washed, a power washer and perhaps an ironer might be recommended for incomes as low as the minimum comfort level. The funds available do certainly limit not only the quantity but the quality of the equipment chosen. The power may be hand power, a gasoline engine, or an electric motor.

The same procedure is followed when choosing and arranging equipment for doing the laundry as is followed for planning a kitchen. Decide what processes are to be done, what equipment is needed or is available to do them, and then arrange the equipment as nearly as possible in the order that the processes are performed. This should result in convenient relationships. The chart on pages 374 and 375 indicates the processes and the equipment required for doing an ordinary family laundry.

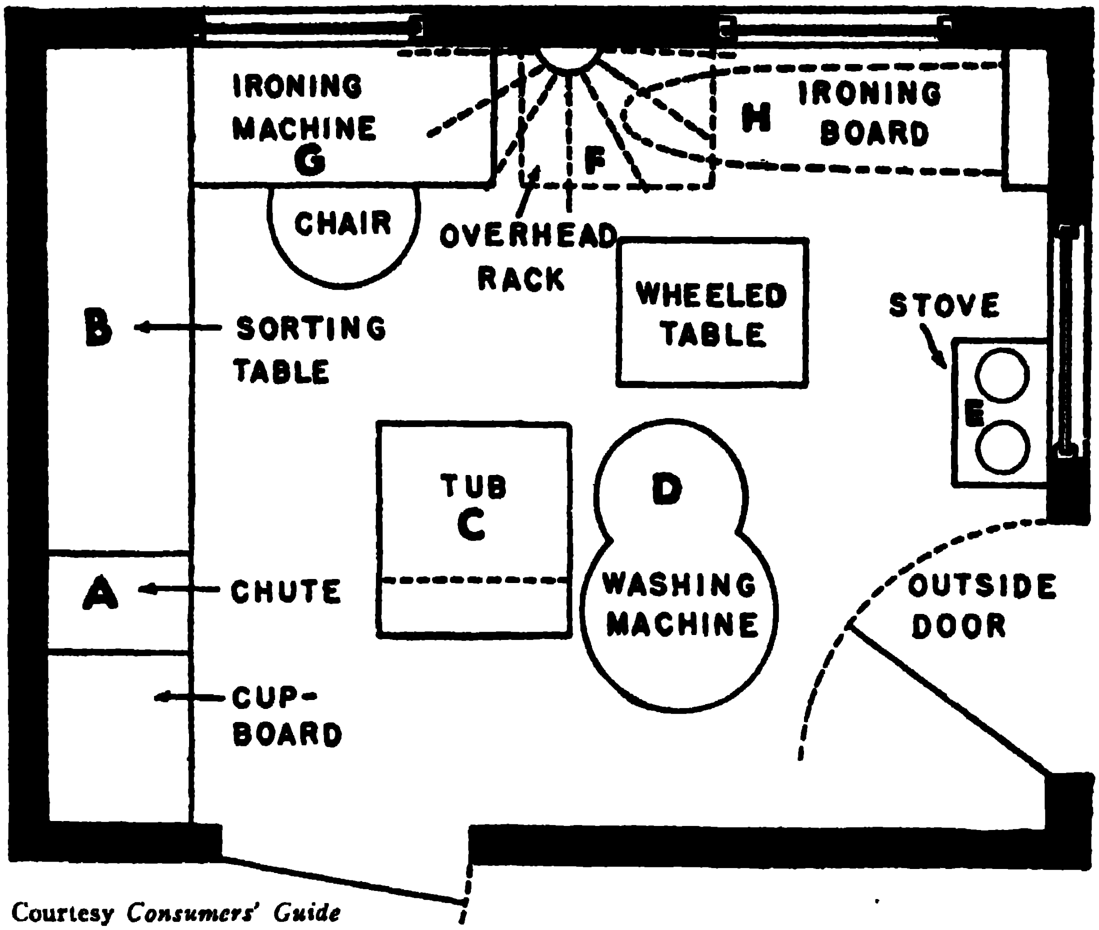
As can be seen, at least two centers are required for the laundry process: preparation of the clothes by mending, removing stains, sorting; washing by soaking, sudsing, rinsing, and making starch and applying it. If provision for drying is made in the laundry a third center will be required. For ironing, the same work surface used for preparing the clothes for washing can be used for sprinkling and folding. An ironing board with its accompaniments or an ironing machine with its accompaniments makes up the other center. In some homes ironing is not done in the same room with the washing but in or near by one where some other activity is under way.

Again, as in the kitchen, the shape of the space available for laundry influences the arrangement possible for the equipment needed. An L-shape, a U-shape, a two-wall, or a separate center arrangement are common. If a corner space is available, an L-shape arrangement is desirable. The end of the work counter used for sorting could be fitted into the corner adjoining the laundry trays, with the washer sitting in the angle in front of the trays. Portable tubs would be arranged in a similar fashion. A storage cabinet for holding sundry small equipment and supplies and possibly the ironing board might follow these. If an ironer is included it should come next. If the work counter is portable it should be moved to the ironing center, otherwise the ironing center might be moved to the work counter so that it might be used as a place to receive

ANALYSIS OF OPERATIONS REQUIRED TO DO A LAUNDRY AND THE EQUIPMENT AND SUPPLIES USED TO PERFORM THE OPERATION

Operation	Processes Included in the Operation	Equipment Necessary	Supplies Necessary
Washing	Collection Bring clothes from place of soil to place of washing. Probably is accomplished throughout the whole week.	Hampers or baskets	
	Mending Darn, patch or otherwise mend all clothes needing it except feet of hose, other unpleasantly soiled clothing.	Needles, threads of suitable colors, scissors, sewing machine.	
	Stain removal Wash out water soluble stains. Use chemical solvents for other stains.	Work counter Shallow pans Storage space for supplies	Stain removers Bleaches
	Sorting For wringer washer. Sort into loads according to white, colorfast and noncolorfast clothing, table linen, type of fabric and whether slightly or much soiled.	Sort on the counter, in clothes baskets or in special sorting bins built in under the counter.	
	For automatic washer. Similar sorting except that temperature of the water and length of washing period is a more important criterion for loads.	The arrangement suggested above is also good. The washer may be the soiled clothes receptacle for those items which use similar washing temperatures and length of washing period.	
	1st Suds In a wringer washer, agitate for 5 to 15 minutes depending on the amount of soil. In an automatic washer set the timing device for a short or regular washing cycle. Extract water.	Hot and cold water supply. Wringer or automatic washer. Measuring cups and spoons. For wringer washer, sticks for lifting hot clothes.	Water softeners. Soaps or syndets.

Operation	Processes Included in the Operation	Equipment Necessary	Supplies Necessary
Washing	2nd Suds For lightly soiled clothes and in automatic washers, this step is usually omitted. In wringer washers, use only if clothes are exceedingly soiled. Extract water.	Same as above if the process is necessary.	
	Rinsing In the automatic washer the clothes are run through two rinse waters automatically. Run clothes from wringer washer through two rinse waters, changing it to keep the last water quite clear. If bluing is desired, add in last water.	Hot and cold water supply. Drain. For wringer washer, 2 to 3 portable tubs or laundry trays.	Bluing if desired.
	Starching if desired.	Pan, spoon, heating unit.	Starch if desired.
	Hanging and Drying Carry to drying yard or clothes dryer. Hang. Remove from line or dryer and fold.	Clothes basket. Laundry cart. Clothes line, clothes pins.	
Ironing	Sprinkling and Folding Lay on a work surface. Sprinkle. Fold and set away to cure.	Work counter. Sprinkler and bottle or brush and small pan. Plastic or oiled silk cover. Clothes basket.	Paraffin
	Ironing Shake and smooth out. Iron.	Flat iron, ironing board or ironing machine. Rubber standing pad. Stool. Work surface. Clothes basket.	
	Airing and Folding Hang to air after ironing. Fold to convenient sizes for storage.	Work surface Racks and hangers	
	Storage Carry to and place in suitable storage space and leave until needed.	Shelves Drawers or trays Hangers	



Courtesy *Consumers' Guide*

A model home laundry layout (10½ ft. x 8 ft.). The soiled clothes go from the bottom of the chute (*A*), to the sorting table (*B*), then to the set tubs for soaking (C). From here some are put into the washing machine (*D*), while clothes for boiling go to the stove (*E*). An overhead rack (*F*) for drying is placed near open windows. Flatwork and other pieces can be ironed with the ironing machine at (G); hand ironing can be done on the folding board (*H*). A small, wheeled table can be moved about for various jobs.

ironed linens for folding. In a U-shaped space sorting and storage equipment might form one leg of the U and ironing the other, with the washer and tubs in the center. If only a long wall space is available, then the equipment can be arranged in a row along it, the principal consideration in any arrangement being to keep the sorting table, tubs, and washer in such a relationship that the clothes make a continuous circuit as they go from the sorting table into the tubs to soak, thence into the washer, and back into the tubs as they are rinsed.

An item preliminary to the laundry processes is the matter of storing soiled clothing and linens. Ventilated containers prevent the possibility of mildew if wet or moist textile garments should get into the container. A laundry chute from the second floor assures that an unsightly accumulation does not occur there. If no chute is possible or available, a portable hamper located at some convenient spot is necessary. The inside of any container should be smooth to prevent tearing or snagging garments.

The object of studying laundry methods, of choosing proper equipment, and arranging it advantageously is to save time and energy. In a study of fatigue problems, Perkins, Beyer, and Bane found that the muscular movements of stooping, stretching, lifting, and carrying add most to the complications and physical fatigue of washing. In the farm home they found that the hardships of washing are caused by deficiencies both in physical facilities and in methods. They have this to say concerning the reduction of the number of movements: [1]

> Washing can be done with less motion if suitable equipment is used, if it is compactly arranged, and if there is enough of it for completing a process once it is started. Observations of washings revealed the following needs:
>
> Three tubs instead of two if clothes are to be soaked.
> Vessels of proper size and shape for heating water where there is no tank heater.
> Plungers for working the clothes up and down in the rinses.
> Smaller and better shaped clothesbaskets.
> Plenty of clothespins in a container that can be pushed along the line or one that can be worn as an apron.

Roberts has this to say concerning laundering:

> From a personal standpoint laundering is one of the hardest tasks of the week, but with modern equipment and conveniences

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[1] Nellie L. Perkins, Wilma Beyer, and Lita Bane, *A Survey of Some Fatigue Problems of Rural Homemakers,* p. 64. University of Illinois, Agricultural Experiment Station Bulletin 514, 1945.

it ceases to be difficult. A housewife with interesting plans for the afternoon can organize her washing and ironing to save time, steps, and energy. However, unless she is really time and energy conscious, she may never plan and simplify her work. High standards of sanitation, cleanliness, and neatness may lengthen the time spent on the task.[1]

A phase of the problem which affects the convenience with which laundering can be accomplished is the available water supply. When water must be carried into the house for laundry as well as for other household uses it is known to add considerably to the amount of time required to do the housework. Facilities for producing hot water used at present range from the almost primitive to the ultramodern, and include the long used tea kettle and the water reservoir connected to the kitchen range, as well as the wash boiler and outdoor water kettle. The cylindrical tank connected to the firebox of the kitchen stove, attached to the furnace, connected to a small coal-burning stove in the basement, or to a kerosene oil heater is the next step in advance. Electric or gas automatic water heaters are at the top of the list. If choosing one of the latter, it is important to select one large enough for family use. In hard-water areas some may desire to further condition the water by softening it. The hard water is filtered through a bed of sodium zeolite, a tasteless, odorless, insoluble substance with the property of abstracting hardening minerals from the water in exchange for sodium. The softening action is instantaneous and renewal of the softening agent is simple and inexpensive. A full-size softener may be attached to the main water inlet pipe and thus all water flowing through it is softened. In addition to a water softener, other equipment may be used to provide special treatment. Dirt and silt can be removed by a sand filter; bad taste and chlorine, or musty and fishy odors can be removed by an activated carbon filter; iron can be removed; and acid waters can be corrected.

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[1] Evelyn H. Roberts, *The Efficiency of the Home Laundry Plant*, p. 39. State College of Washington, Agricultural Experiment Station Bulletin 248, 1931.

A homemaker in any locality which has good commercial laundry facilities is confronted with the problem of choosing whether she shall send her laundry out or do her own. Her decision should rest upon the amount of money available from the family budget to be spent for laundry purposes, the amount of time which the homemaker has to apply to laundry work, and the value of her time if used for other purposes.

The table on page 380 shows home laundering costs as found in a study of 188 homes.

If a homemaker wishes to compare the costs of doing the home laundry and having it done by power laundry the items shown on this page should be considered.

	POWER LAUNDRY COSTS	EQUIPMENT OPERATING COST IN HOME	LABOR COST IN HOME	MATERIAL COST IN HOME	TOTAL COST
Power Laundry Services					
Damp wash........					
Rough dry...... ...					
Finished family.....					
Special:...........					
Home Methods					
Minimal equipment.					
Washer and iron....					
Washer, iron, and ironer...........					

In general it will be found that the place where laundry is done varies with the climate, the amount of space available in the house, and the amount of laundry done. The kind and amount of laundry equipment needed depends upon the nature and amount of laundry work to be done, the funds available, the power available, and the water supply. To arrange a laundry space one should decide what processes are to be done, what equipment is to be used to do them, and then plan to place the equipment so that the processes can be followed in sequence. The cost of doing the laundry in the home should be calculated and compared with the cost of sending it out before extensive expenditures are made for equipping a home laundry.

THE AVERAGE COST OF DOING THE HOME LAUNDRY WHEN DIFFERENT TYPES OF EQUIPMENT WERE USED [1]

Equipment	Number Families Reporting Cost	Average Original Cost	Average Cost of Heat and Power per Time Used	Average Cost of Equipment, Repairs, and the Interest per Time Used	Average Cost of Small Equipment per Time Used *	Average Cost of Materials per Washing **	Total Average Cost
Washing machine							
Hand power machine	3	$ 18.30		0.046	0.019	0.192	0 257
Gasoline motor machine							
Less than $ 50.00	2	25.00	0.046	0.106	0.019	0.192	0.363
$ 50.00 to 99.99	3	67.33	0.075	0.202	0.019	0.192	0.488
100.00 to 149.99	3	118.33	0.047	0.289	0.019	0.192	0.547
150.00 over	3	187.00	0.039	0.474	0.019	0.192	0.724
Electric power machine							
Less than $ 50.00	31	34.6600	0.0697	0.0846	0.019	0.192	0.3653
$ 50.00 to 99.99	54	69.403	0.0660	0.1721	0.019	0.192	0.4491
100.00 to 149.99	29	116.380	0.0566	0.2821	0.019	0.192	0.5497
150.00 over	23	169.370	0.0998	0.3550	0.019	0.192	0.6658
Irons and ironer							
Hand iron							
Sad	7	3.07	0.0150	0.0067	0.0042		0.0261
Gasoline	6	4.33	0.0209	0.0156	0.0042		0.0407
Electric	139	5.61	0.1529	0.0150	0.0042		0.1721
Ironer	14	83.159	0.2452	0.1406			0.3858

* Average cost of small equipment for washing includes tubs, washboards, and baskets.

** Average cost of small equipment for ironing includes ironing boards.

Average cost of materials per washing includes a combination of bar and flake soap, water softener, starch, and bluing.

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[5] Ellen R. Lindstrom, *The Cost of Laundry in 188 Kansas Homes*, p. 62. Unpublished Master's Thesis, Kansas State College, 1937.

Suggested Activities

1. Analyze the laundry situation in your family and decide whether it is better to do the laundry in your home or to send it out. Give reasons for your decisions.
2. If you decide that the family shall do its own laundry, plan the most advantageous placement of the laundry equipment in your home.
3. If you decide to send the laundry out, upon what basis will you decide where it will be sent?

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Problem 5. WHAT PROVISIONS MAY BE MADE FOR SEWING AND MENDING?

The extent of the provision in the house for sewing and mending should be in proportion to the amount of this work done. Like the laundry processes much of clothing construction has been removed from the home and is now done by outside agencies. However, practically all families mend, and many families still do considerable garment construction, hence to whatever extent these are done, there should be provision for them in the house.

Unlike the somewhat standardized conditions surrounding the processes of food preparation and of laundering, the provisions for sewing must vary according to the amount of sewing done, the manner in which sewing is incorporated into the homemaking schedule, the number of persons in the household who sew, and the preference of the persons who sew as to whether they wish to be alone while sewing or whether they wish to work near the center of family activity.

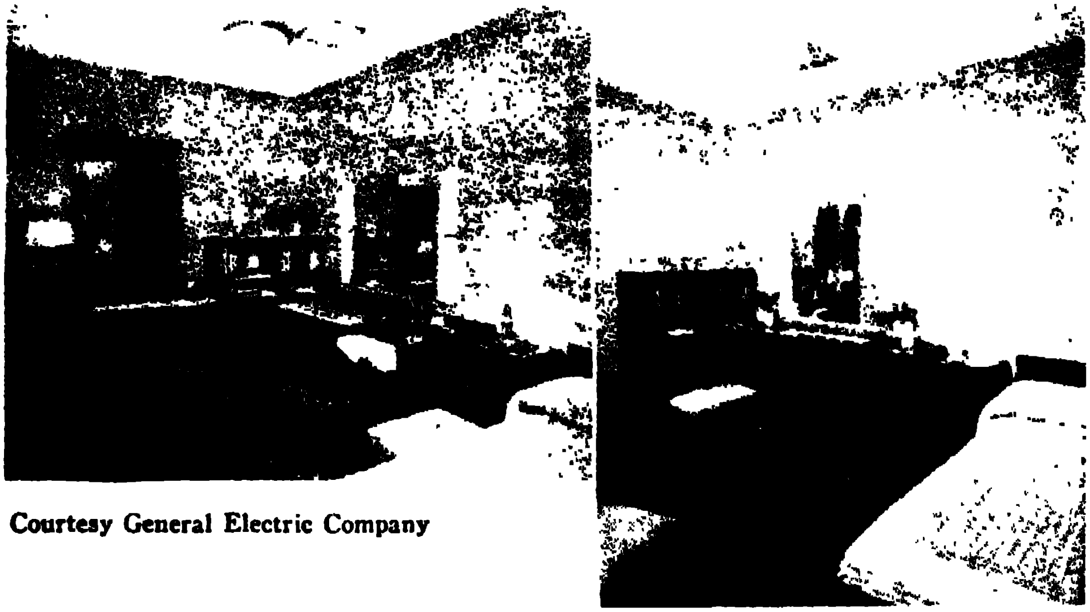
Regardless of where or how sewing for the family is done, certain general conditions facilitate the work and contribute to pleasure in it. Illumination both natural and artificial should be good for work on fine or dark-colored goods. Large windows are preferable to small ones, but in any case the light should be softened by means of glass curtains, Venetian blinds, or translucent roller shades. Adequate artificial lighting should be properly diffused and located to give light where it is most needed. Illumination of high intensity should be directed on the sewing. In this case practically undiffused illumination will bring the sewing into sharp vision. Walls that are decorated in colors of light value are further aids to illumination. The place chosen to do sewing should be cool in summer and possible to heat in winter. Most people prefer to do sewing out of sight of the living room, especially if they must continually leave the work after sewing for only a short time.

The best possible provision should be made for doing the amount and kind of sewing usual to the family. If garments are made, table space for cutting should be provided, so placed that the work may be left laid out. Basting may be done on the cutting table or at a lower table. A sewing machine is necessary, as is space for its use and storage. A large mirror should be provided for fitting garments. A dress form may be used, and a stool to stand on while hemlines are made is helpful. Space for an ironing board with sleeve and seam boards, pressing cloths and steam or the usual pressing iron should be available. The appearance of a garment is improved if it can be pressed as the seams are run up. In addition there should be accessible storage for scissors, chalk, pencils, pins, needles, tracing wheel, and skirt marker. Patterns, scraps, and new material find storage in drawers or similar spaces. Fashion magazines, counter sheets, and catalogue are best stored on shelves. Space to hang partially finished garments prevents extra work in straightening.

The sewing machine should be placed in such a way that it is ready to use with as little effort as possible. If the person who does the cutting sits while working, a procedure recommended as energy saving, almost any table which is long enough to hold the pattern spread out is usable. If she prefers to stand, a higher table is more convenient. It is desirable that the table be high enough that stooping is unnecessary either to reach the material or observe the cutting. For most people this height may be 40 inches or a little higher. If it is necessary to move the sewing center from place to place in the house, it is a good plan to make all of the sewing equipment portable. Easily cleaned floors make a contribution in preserving order.

In homes in which much sewing is done by the family it may be advisable to have a special sewing room. If more than one person sews, the room should be large enough to accommodate all at the same time. In large families for which the mother must do much cooking, this room might well be accessible to the kitchen. A sewing room upstairs withdraws the clutter accompanying sewing, but the person doing the sewing there may be subject to interruptions from the doorbell, the telephone, and demands from members of her family.

In most homes it is perhaps necessary to combine the sewing room with some other room. Several such combinations are suitable. The clothery or the utility room is a combination already suggested. It is located near the kitchen and makes provision for the laundering, the ironing, the pressing, and the repair and construction of clothing. A room such as this centers all the work that is connected with the care



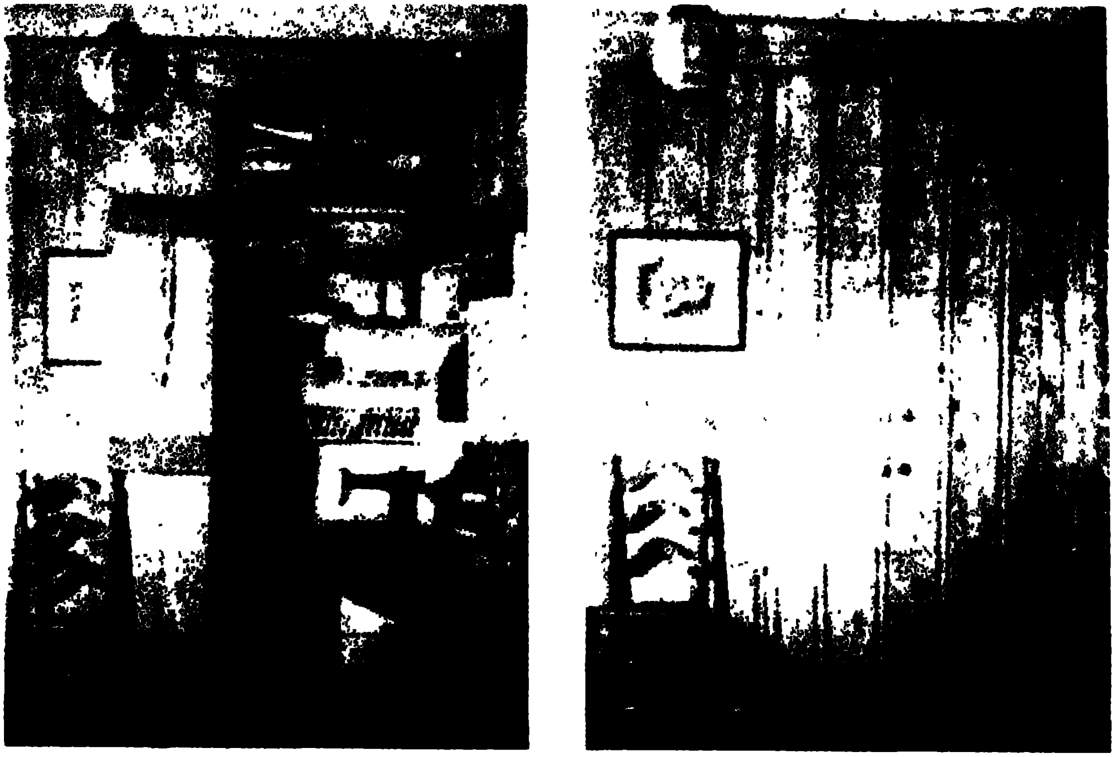
Courtesy General Electric Company

A guest room may be transformed into a sewing room. *Left*, the room as a sewing room; *right*, as a guest room.

and construction of clothing in one place. In this case the cutting table might be the sorting table for the laundry and surely could be made high enough for comfort.

Families who have few unexpected guests, or those who stay for short periods, may combine the sewing room with a guest room. A satisfactory arrangement for such a room might include two closets. One of the closets might have space enough for a roll-away bed, a built-in set of drawers, and hooks and rod. The other closet could be fitted for the storage of the equipment and supplies used in connection with sewing. Thus it would be possible to make a quick transition of the room from one purpose to the other.

The dining room and sewing room may be combined if the family habitually eats most of its meals in the kitchen or in a dining nook. In such cases, a dining room located aside from the living room so that it can be closed up when desired is particularly adapted to this combination. The dining table can be extended to use as a cutting table, although it may be necessary to raise it for comfort in cutting. There should, of course, be a closet in the room large enough to store the sewing machine, a chest of drawers, the dress form, and any other equipment used in sewing or mending.



Courtesy Herbert Sinnard, Architect

A built-in sewing closet. Notice that the closet is practically concealed when the doors are closed.

A playroom may be combined with the sewing room in families in which all of the children are of school age and in which the mother would usually do the sewing during those periods when the children are in school. Again there should be sufficient closet space to care for the equipment and supplies necessary to sewing, and in families in which the children are small it should be possible to lock the closet. The ping-pong table is ideal for a cutting table, if the person will sit to do the work.

Other rooms in which sewing may be done are the office or den and the living room. Sewing in the office or den usually demands that the work be put away before the time when the father or other members of the family desire to use the room. Sewing in the living room can be done with no objection to the arrangement if most of the family is away during the day and if but few formal callers come. However, the living room should be cleared and free to all members of the family when they are most likely to want to use it.

Provisions for sewing and mending should be made in the house according to the extent to which they are done by the family members. Thought should be given to making arrangements for these activities as convenient and comfortable as possible. A large amount of sewing being done by the family may justify setting aside one of the rooms of the house for that purpose. However, it is likely that the sewing will usually be done in a room used for other purposes as well. Combinations include a clothery, a guest room, dining room, playroom, den or office, and living room.

Suggested Activities

1. What plan can you make for your own sewing center for mending?
2. Sketch a plan of a sewing room with arrangements for one person to sew.
3. Sketch a plan for the sewing to be done in a room designed for other purposes.

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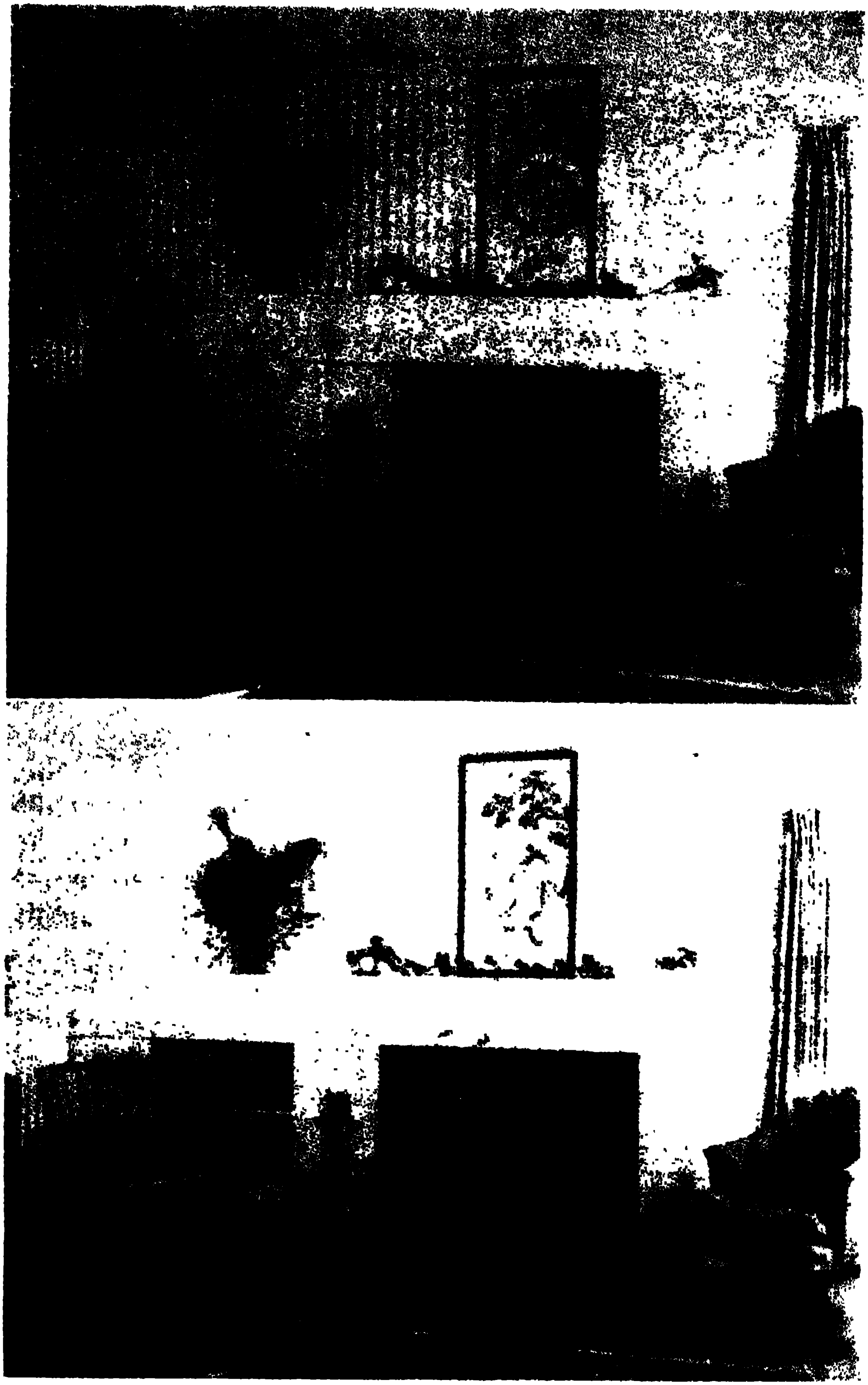
Problem 6. WHAT CONSTITUTES ADEQUATE AND DESIRABLE STORAGE SPACE FOR A HOME?

A place for everything and everything in its place is a first principle of law and order. Successful housing involves the provision of adequate storage facilities throughout the various parts of the house to serve the work areas and to contribute to the usefulness and beauty of social, rest, and recreational areas. Well-ordered living is difficult of accomplishment with inadequate, poorly planned or poorly organized storage spaces.

Lack of adequate storage is one of the deficiencies in dwellings about which we hear a great deal. The preciseness with which a system is developed, however, should be left to the individual family. In considering storage, it is important to remember that it is not an end in itself, although satisfaction may be gained from an orderly arrangement. A system or plan of storage is worthwhile only when it results in some definite ultimate good for the family. If it results in family life going on with less friction, if it can make the work of the home lighter and thus release time and energy to be devoted to some other worthwhile activity, if a greater pride in the home results because of the order that comes from good storage, then it has resulted in an ultimate good. If lack of adequate storage creates a cluttered, confused background for family living, necessitates the added expenditure of time and energy in the dispatch of household tasks, and increases the stress and strain in family relationships day by day, it is extremely costly.

The storage problem of any household is a large and complex one due to the number and variety of things to be stored. Not only adequate facilities but also a functioning system are necessary to its solution. Convenient records of the storage location of objects and the habit of returning to the assigned places all objects removed for use tend to simplify the problem. It is impossible here to suggest solutions for all phases of the storage problem, but the analysis of storage needs gives some idea of its complexity, and may give rise to ideas as to how adequate provision may be made.



Storage space in the fireplace unit may be open or concealed.

ANALYSIS OF STORAGE NEEDS

- Personal Things
  - clothing that hangs
  - clothing that folds
  - out-of-season clothing
  - sanitary goods and toilet articles
  - accessories
  - keepsakes
  - shoes

- Outside Wraps
  - coats
  - jackets
  - sweaters
  - overshoes
  - caps
  - hats
  - gloves
  - umbrellas

- Bedding and Linen
  - comforters
  - quilts
  - blankets
  - pillows
  - sheets
  - towels
  - pillow cases
  - dresser scarves
  - curtains

- Cleaning Equipment and Supplies
  - vacuum cleaners
  - carpet sweepers
  - brooms
  - brushes
  - polishes
  - mops
  - pails
  - soap
  - dust cloths
  - tools

- Sewing and Mending Equipment
  - sewing machine
  - thread cabinet
  - cutting surface, etc.

- Food Supplies
  - Current
    - staples
    - meat
    - poultry
    - fats and oils
    - fresh fruits
    - fresh vegetables
    - dairy supplies
  - Canned, Cured and Other Surplus Food
    - canned fruits and vegetables
    - canned and cured meats
    - preserves and jellies
    - dried foods
    - root vegetables
    - sugar
    - flour
  - Foods Prepared for Trade
    - dairy products
    - honey
    - poultry products
    - baked products
    - canned and preserved foods

- Luggage
  - suitcases
  - trunks
  - keys
  - camp beds

- Fuel
  - wood
  - gasoline
  - kindling
  - coal
  - kerosene

- Out-of-Door and Seasonal Equipment
  - lawnmower
  - hoe
  - sickle
  - roller
  - screens
  - storm windows
  - rake
  - hose
  - spade
  - seats
  - swings

Laundry Equipment and Supplies
- washing machine
- tubs
- basket
- hamper
- iron
- ironers
- ironing board
- tables
- pails
- soap
- water softeners

Kitchen and Dining-Room Utensils and Linens
- Dishes (china and glassware)
- Food preparation utensils
  - oven cookery
  - top of stove cookery
  - electrical cookers
  - mixing utensils
  - cutlery
  - dish pans, etc.
- Linen
  - table linen
  - dish towels
  - dish cloths
  - mats

Hobbies and Collections
- stamps
- photography
- woodworking
- painting
- basketry
- first editions
- rare stones
- clay modeling
- scrap books
- lace making

Sports and Recreation Equipment for
- skating
- shooting
- golfing
- fishing
- riding
- skiing
- swimming
- hiking
- tennis
- baseball
- croquet
- quoits
- archery
- indoor games
- books, etc.
- toys
- bicycle
- perambulators

Medicines and Sickness Equipment
- taken internally
- applied externally
- poisons
- hot water bottle
- thermometers
- bed pan

Home Business and Correspondence
- business records and papers
- account books
- bulletins
- instruction books
- catalogues
- stationery and supplies

Unclassified
- Objects of probable intrinsic value held for possible future use
  - discarded furniture
  - unused pictures
  - outgrown toys
  - old magazines
  - old rugs
  - decorative objects

Regardless of the particular storage need that is being considered, successful provision for it will accomplish several purposes. In addition to improving the sense of order and general appearance in the home, it should facilitate the activities being carried on and preserve and protect the material being stored. Good storage design requires planning of arrangement of fixtures which will contribute to:

A. Convenience
  Ease of access (near to the activity it serves)
  Maximum reachability and availability
  Maximum visibility
  Orderliness
  Maximum use of space allotted
B. Preservation
  Of smooth condition
  Of freshness (freedom from odors)
  From moths, mice, flies, ants, and other destructive pests.
  From dust, sunlight, moisture, noxious gases, molds, adverse temperature.
  From pilfering.

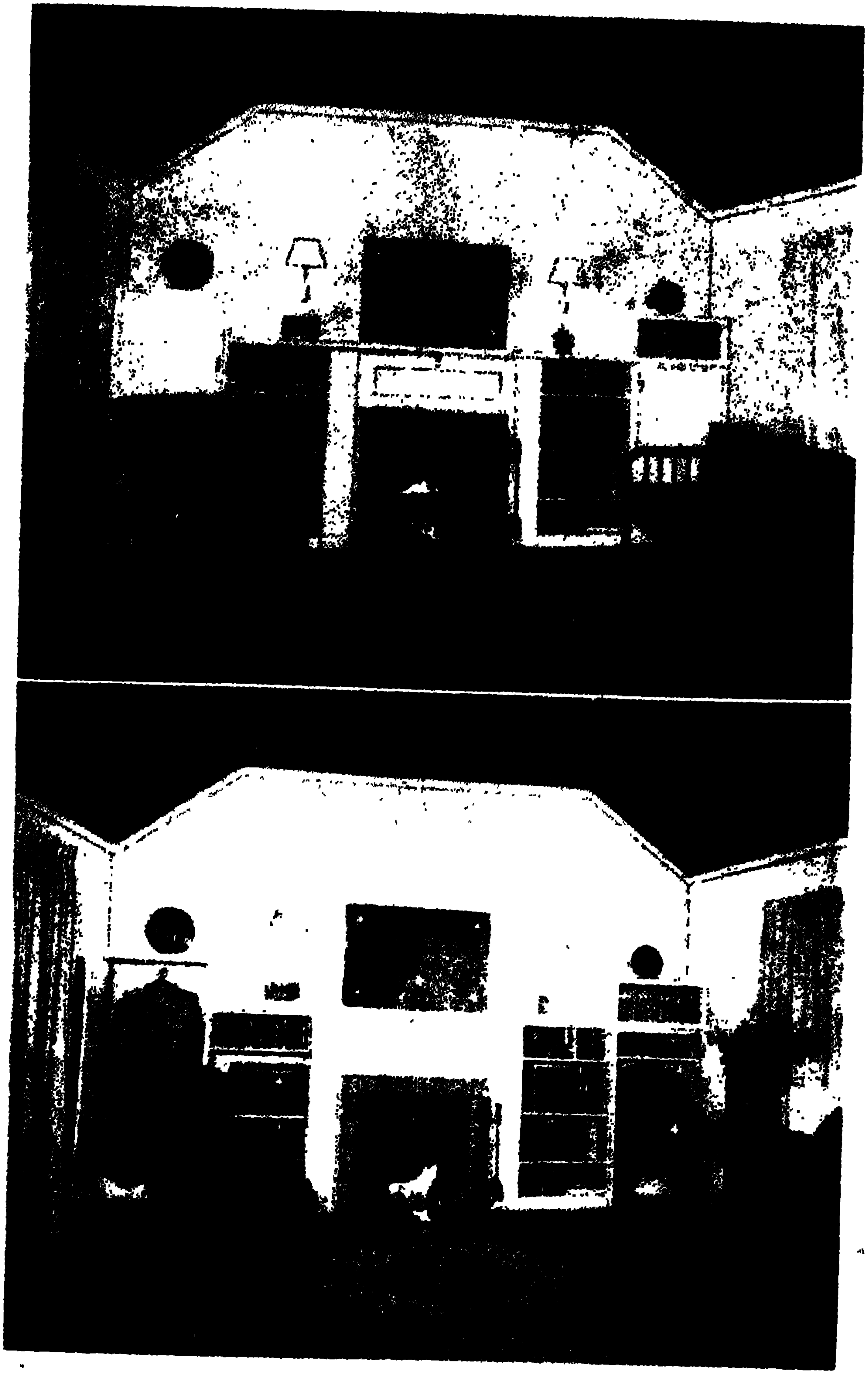
These are not always obtainable simultaneously and some are mutually exclusive. For instance, maximum availability may be obtained by eliminating doors, but such a procedure results in minimum security from dust, moths, and other household pests; maximum reachability may result in unused space at top and bottom of closet or cabinet.

The problem of storage is accentuated by several situations. One of these is the amount of material to be stored. This has increased with the industrialization of our times and the attendant availability of goods. It is said that this generation are collectors of gadgets. The increased amount of material to be stored is in itself a problem, and, further, it contributes largely to another problem, that of ready use of possessions necessary to the work of the home. The more there is to store in limited space, the harder it becomes to organize and place tools, equipment, and other possessions so they can be easily located and brought into action. The accelerated pace of present-day living necessitates such organization and access of goods stored in the home if things are to serve the household rather than hinder it.

Houses built a quarter of a century ago had but few closets or built-in features, often poorly located. These houses, however, usually had attics and basements which were used for the storage of many articles not in current use. The need for basements has been removed in some of the newer houses by improved central heating units using gas or oil with forced air circulation needing no storage for fuel in the house. Attics may not be included because a needed bedroom has been tucked under the eaves. When adequate storage is not provided in the house, the care of articles not in use is next to impossible.

The garage has been suggested as a possible means of replacing the storage area lacking in houses without basements or attics. The most obvious waste of space in any garage is that above the motor of the car. Cabinets as deep as 44 inches built above this space will accommodate screens, luggage, tools and sports equipment having seasonal use, and other bulky articles. A clearance of eight inches above the hood of the car is sufficient. If the garage is built a few feet wider than is necessary for the car, easily accessible storage along the walls is available. A garden center in such an area would store tools for outside use and facilitate repotting and pruning of plants for the house.

Inside the house pieces of furniture such as chests of drawers, cabinets, and others have long been used for storage. Closets provide storage for clothes and other articles that hang. Fittings of shelves, drawers, slots, and other items in closets or in built-in fixtures increase the usability of space for storage of other things. There have been suggestions for making some of the nonload bearing partitions of the house into storage panels to serve rooms on one or both sides of the partition. Such storage area could be 12 or more inches deep and divided into various kinds of storage. Similar storage accessible to one side could be developed along other walls or in houses already built. Although this practice reduces wall space for setting furniture, such use may render



A half-storage wall around a fireplace provides open storage for books and radio as well as enclosed storage.

This cornerwise cabinet on the counter stores materials and eqiupment at a proper height near the place they are to be used. It groups the articles to be used together, and makes it possible to remove each without handling another.

the furniture itself no longer necessary. Unused spaces which may be developed for storage include spaces under the eaves, under the stairs, in corners, in furred-out walls or places closed by construction, near chimneys, and along hallways wider than necessary for passage. Cabinet work built on the job is costly, but it may be the only way of procuring good storage in an existing situation. It is hoped that standard units may be developed which can be produced by industry at a reasonable cost.

Successful storage requires adequate space as determined by the size, shape, and number of the items to be stored in due relation to the activity which each item will serve and the order in which the various processes of the activity are to be performed. Storage should be planned with due regard for each specific work center. Rules follow:

1. Store materials and equipment near the place where they are to be used, preference in location being given to things used most often.
2. Store frequently used materials and equipment at proper heights, thus avoiding any unnecessary stooping and high reaching on the part of the worker.
3. Arrange articles so that each may be removed or replaced without handling another.
4. Group articles of similar nature together.
5. Label storage used by many different people.
6. Label stored articles not to be used for some time.
7. Discard or give away seldom or never used articles.

An organization plan for storage should be worked out for each of the major work centers. The first step in such a plan is a listing of the items to be used in dispatch of the work of that center. Then note is taken of the items less frequently used; the next step is the checking of articles on the list requiring special consideration, and the fourth step is the formulation of detailed arrangement plans. These may be checked by carrying on the work of the center for a day or so and noting desired changes.

The placement of the food and equipment needed in the serving center might be used as an illustration of the development of a plan for storage about any work center. Wilson[1] suggests the following as the list of items desirable to store in the serving center:

Bread, cake, cookies
Ready-to-eat cereals, crackers, etc.
*Loaf sugar, honey, candies, dried fruits served from packages
Relishes not requiring low temperature
Bread and cake knives, bread board, cake rack
Ladles and serving spoons, serving forks, butcher knives
Dishs, silver and linen used for everyday meals . . .
*Dishes, silver, linen, and table decorations used for company meals, and infrequently used dishes, unless provided for in dining room
Mats for hot dishes, serving trays

Asterisks have been placed beside the items less frequently used in a typical household, note being made that these might be stored in a convenient place, adjacent to if not included in the serving center. If an infrequently used article is stored in the work center, it takes up space needed for articles in constant use.

The list then may be checked for items requiring special consideration.

Bread, cake, cookies, and silver are among these items. Their placement may be determined by the location of special facilities in the cabinets as for example, tin-lined

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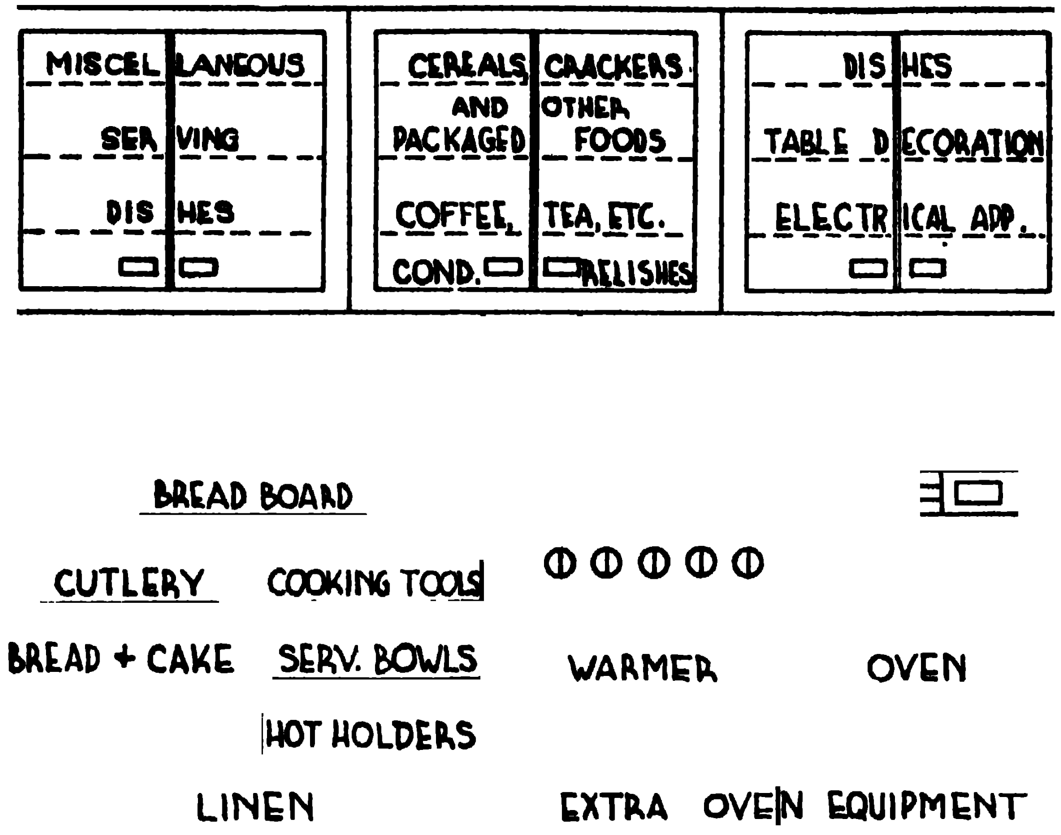
[1] Maud Wilson, *Closets and Other Storage Arrangements for the Farm Home*. U. S. Department of Agriculture, Bureau of Home Economics.



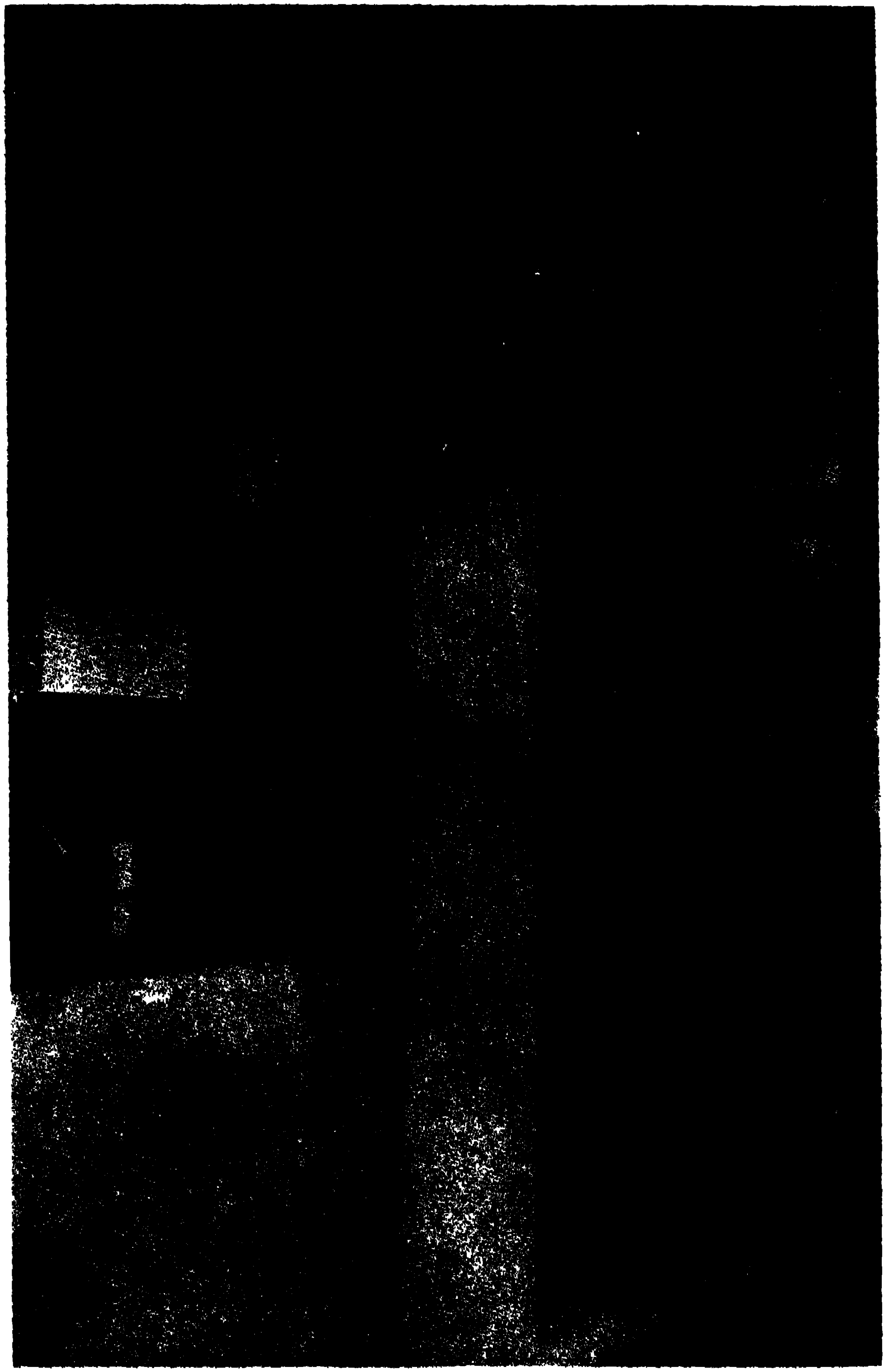
Suggested arrangement for a serving center.

bread or cake box and a treated fabric-lined drawer for the silver. Detailed plans for the arrangement of these and other items are shown on this page. As has been previously suggested, a check which should precede final acceptance of any arrangement is the experience of the worker in carrying on her duties in the work center.

The determination of the space desirable to allow for the storage of the staple foods and equipment usually found in the kitchen is difficult. In a survey of 200 farm homes, Carter found the amounts of staples and equipment in the average home as is shown on page 398.

The quantity of things stored in any one kitchen may vary considerably from those listed above. Each family should determine the spaces required in its own kitchen, with regard to its buying habits and its supply of equipment.

Some standards in regard to sizes and arrangement have been established which should be helpful in planning storage



Courtesy Janes & Kirtland, Inc.

Equipment should be stored near the place of use. Note the floor-to-ceiling cabinet near the range.

TYPICAL QUANTITIES OF KITCHEN STORAGE BASED ON SURVEY OF 200 FARM HOMES IN ARKANSAS[1]

ITEMS	AMOUNTS
Staple supplies	
Flour	48 pound sack
Sugar	100 pounds and $1.00 worth
Meal	25 pounds
Salt	25 pounds and package
Cereals and packages	12 items
Spices and extracts	7 to 12 items

ITEMS	AMOUNTS
Utensils used in cooking	20 pieces
Chinaware and dishes	69 pieces
Silverware	23 pieces
Small tools and flatware	16 tools
Canned goods	200 quarts
Cleaning equipment and supplies	
Handled tools	3
Brushes	3
Soap	12 bars
Other items	6
Linens	25 pieces
Miscellaneous	6 pieces

in the kitchen. If flour is purchased in 48-pound sacks, it is advisable to store it near the mixing center. A drawer-bin on rollers approximately 15 inches by 27 inches by 22 inches is large enough to hold a sack of flour and the scoops, sifters, and other utensils ordinarily left in it. When sugar is bought in 100-pound lots, it is usually suitable to store only a portion of it near the mixing center. A second drawer-bin on rollers the same size as that for the flour is often advised.

The minimum amount of shelf space necessary for storing utensils, dishes, and staples has been determined by Wilson:[2]

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[1] Dean G. Carter, *Studies in the Design of Kitchens and Kitchen Equipment*, p. 9. University of Arkansas, Agricultural Experiment Station Bulletin 276, 1932.

[2] Maud Wilson, *Closets and Other Storage Arrangements for the Farm Home*, figures quoted from Plan VII, U. S. Department of Agriculture, Bureau of Home Economics.

SHELF SPACE	WIDTH	LENGTH
For utensils	12 inches	7 feet
Dishes for 6	12 inches	7 feet
Staples purchased in large quantities	16 inches	5½ feet
Other foods	12 inches	20 feet

These provisions make a total of 39½ linear feet of shelving. The adaptability of shelves to the height of the thing being stored is desirable and may be accomplished through removable supports placed about three inches apart along the ends of the shelves.

In determining distances between shelves or trays, allowances should be made for space at the top of a pile of articles. If the articles are light weight and at a convenient height, about one to two inches is sufficient clearance. For heavier objects suggested clearances are:

	INCHES
Shelves at elbow height or above	4
Shelves below elbow height	6
Drawers or trays	2

A desirable distance between shelves that are 15 to 18 inches wide is 10 inches. If shelves are 24 inches wide, they should be at least 12 inches apart.[1]

Usually it is best to store articles only one row deep on a shelf unless they are of a kind, as for example, tumblers, sherbet dishes, canned food, or soap supplies.

Sectioning of shelves and drawers is advised for storing many articles in the kitchen, for cleaning cabinets, and other places. Lids, pie and bread pans, trays, and other things of similar shapes are easy to reach from sectioned shelves or drawers. Cutlery and stirring utensils are easily sorted in sectioned drawers. In parts of the country, where dust is not a problem, provision for hanging small utensils in the open may be found desirable. Cutlery and related equipment

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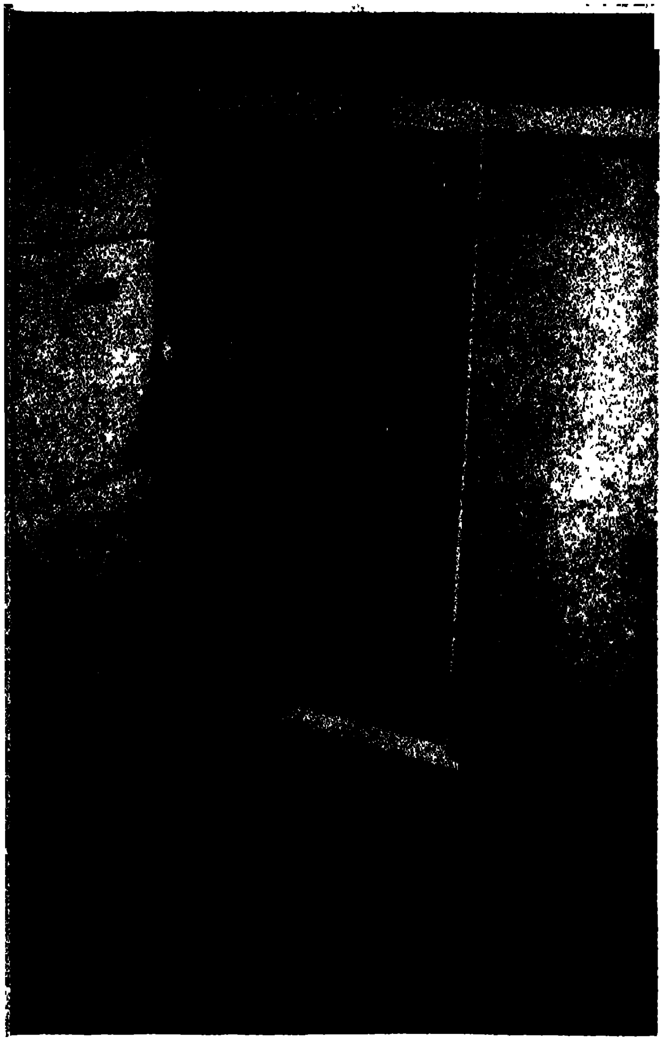
[1] *Ibid.*



Storage of pans and lids in a file is convenient. Removable dividers make cleaning easy.

placed above or near the working surface add to the efficiency of the work center.

Shelves, drawers, or trays in the kitchen as well as in various other parts of the house are frequently hindrances rather than helps because of size and shape. Often they are built too deep, necessitating several layers of many different articles one on top of the other. Can the appearance of nicely ironed table linen be preserved if several cloths and napkins must be placed in a pile, or can the order of a utensil drawer be regulated if the utensils must be stacked to utilize the space? Perhaps if the drawers are already present and must be continued in use, shallow trays could be inserted which would lift out or shift from front to back or side to side. A drawer or tray for silverware and cutlery should be no deeper than 3 inches. This depth will usually allow for the storage of measuring cups in the cutlery drawer.

Protection of surplus supplies should be made in the storage arrangement. Canned food is commonly on hand in a surplus supply. The space allotment and the conditions for keeping it should be carefully controlled. The food-storage room should be well insulated and ventilated if anything aside from sealed containers are stored. Wilson says: [1]

> If there is a window in the room it should be equipped with an opaque shade. Shelves should be movable and adjustable as

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[1] *Ibid.*

Courtesy Office of Education and the Electric Home and Farm Authority, Inc., Chattanooga

Movable partitions in a drawer for storing pot covers and other flat utensils are a convenience.

to distances apart. An interval of 3 inches is satisfactory, the lowest slot being placed 9 inches from the floor. The highest shelf should be not more than 72 inches from the floor. . . . For estimating the amount of shelving, the following is a good working basis:

Pint and quart glass jars—19 feet per 100 jars, stored 2 rows to the shelf
Half-gallon glass jars—20 feet per 100 jars, stored 2 rows to the shelf
Tin cans, No. 2½—9 feet per 100 cans, stacked two deep, and stored 2 rows to the shelf
Pint glass bottles—9 feet per 100 bottles, stored 3 rows to the shelf

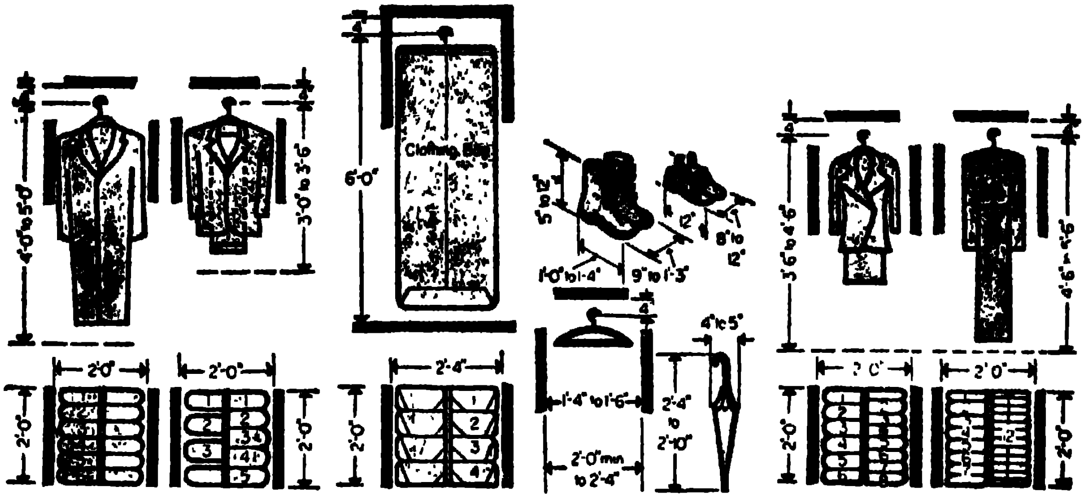
To estimate the distances between shelves, add 2 inches to the height of small containers and 8 inches to those too heavy to move easily. The heights of containers in common use are shown on page 402.

A hall closet provides storage for long dresses, bedding, and other items. Extra protection is given in this closet by doors which enclose the shelves.

Glass Jars	Inches
Half-gallon	9½–10½
Quart	7 – 7½
Pint	4 – 5½
Half-pint	3½– 4
Jelly Glasses	
Tall	3½– 4
Squat	2 – 3
Bottles	
Pint	12
Tin Cans	
No. 2½	5
No. 10	7

Stone Jars	Inches
2 gallon	10
5 gallon	12½
10 gallon	18
15 gallon	23
20 gallon	28
Jugs	
Half-gallon	10
1 gallon	10
Crate, 30 pound	5
Apple box, 60 pound	11
Potato Sack	
100-pound	32
50-pound	28
Basket, 1-bushel	18

Among the storage spaces which are often poorly planned are those for the sleeping and dressing areas. General considerations for the bedroom closet have already been given. The size, shape, and arrangement of the closet should be such as to make readily accessible all articles which are in frequent use. Its fittings should be dimensioned in height to accommodate the tallest person likely to use it and possible to change to accommodate varying heights of people.



Men's Clothing. A 2-ft. unit will hold 6 to 8 overcoats, 5 to 7 suits, 4 to 6 clothing bags.

Dead storage. Two feet will hold 4 clothing bags.

Dimensions for shoes, overshoes, umbrellas and typical clothes hangers.

Women's clothing. A 2-ft. unit of storage space will hold 6 to 8 clothing bags, 8 to 10 suits, 8 to 14 dresses.

Courtesy *Architectural Record* combined with *American Architect and Architecture*

Space requirements for closets.

To determine the length of rod required to hang any wardrobe without crushing, multiply the number of articles usually owned by the length of rod required to hang each. Wilson suggests the following space requirements: [1]

MEN'S AND BOYS' CLOTHING	INCHES
Suits	2
Trousers	3
Overcoats	4
Shirts	1½
GIRLS' CLOTHING	
Wash dress	1½
Coat without fur collar	2
Coat with fur collar	3

WOMEN'S CLOTHING	INCHES
House and street dresses	1½
Skirt	2
Jacket	3
Evening dress	2
Coat without fur collar	5
Coat with fur collar	6

When placing rods, allow the following minimum distances from center of rod to the wall: [2]

	INCHES
For adult use	12
For children 6 to 12 years of age	10
For children 3 to 5 years of age	8

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[1] *Ibid.*

[2] *Ibid.*

The height of the rod should be determined by the requirements for the longest garment to be hung on it. The following are the requirements for the distance between floor and top of rod or wardrobe hook (assuming use of hanger which places top of garment 4 inches from top of rod).[1]

	INCHES
Garments of adults, general use	63
Short coats, skirts, shirts	45
Evening gowns	72
Garments stored in mothproof bags	72
Garments of children 6 to 12 years of age	45
Garments of children 3 to 5 years of age	30

The best space between the top of the rod and the bottom of the shelf above it is 2½ inches. Some parts of the wardrobe are best hung on hooks. The spaces for hooks are recommended in the table on this page.[2]

	INCHES		INCHES
Bedroom closet, hook to hook	7	Hook to corner	3½
Play coats, small children	9	Hook to corner	4½
Chore coats, men	12	Hook to corner	6
Distance between top of hook and bottom of shelf above it			4
Depth of space occupied by garments on hooks			4

Shelves are a convenience in a closet. The amount of space required for storing articles of common use on shelves is shown in the table on page 406.[3]

Shoes may be stored on low shelves, or shoe racks. The length of the shelf or rack should be 14 inches, 18 inches, or 21 inches, to allow for 2 or 3 pairs of women's or men's shoes.

Every family has a supply of household linens for which adequate storage must be made if the various pieces are to be kept in good condition. A closet or cabinet opening directly into a hall and located on the same floor as the

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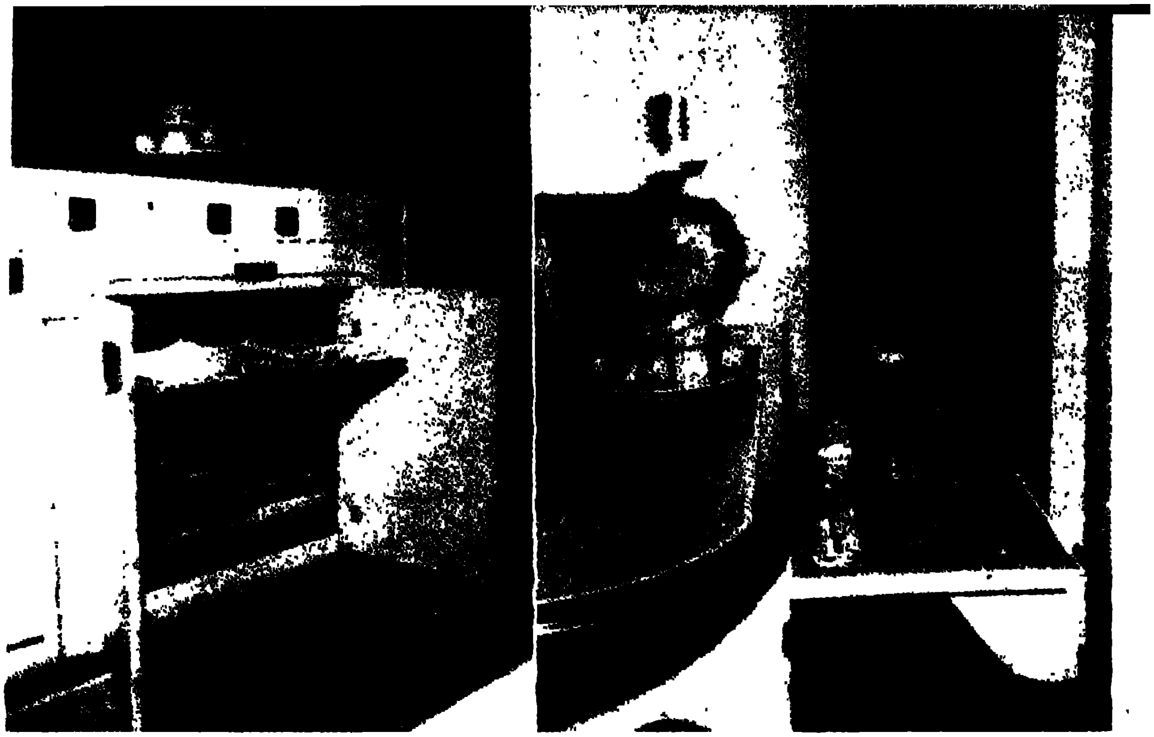
[1] *Ibid.*

[2] *Ibid.*

[3] *Ibid.*

Courtesy Richard Averill Smith, Inc., and Louis Hessler, Designer

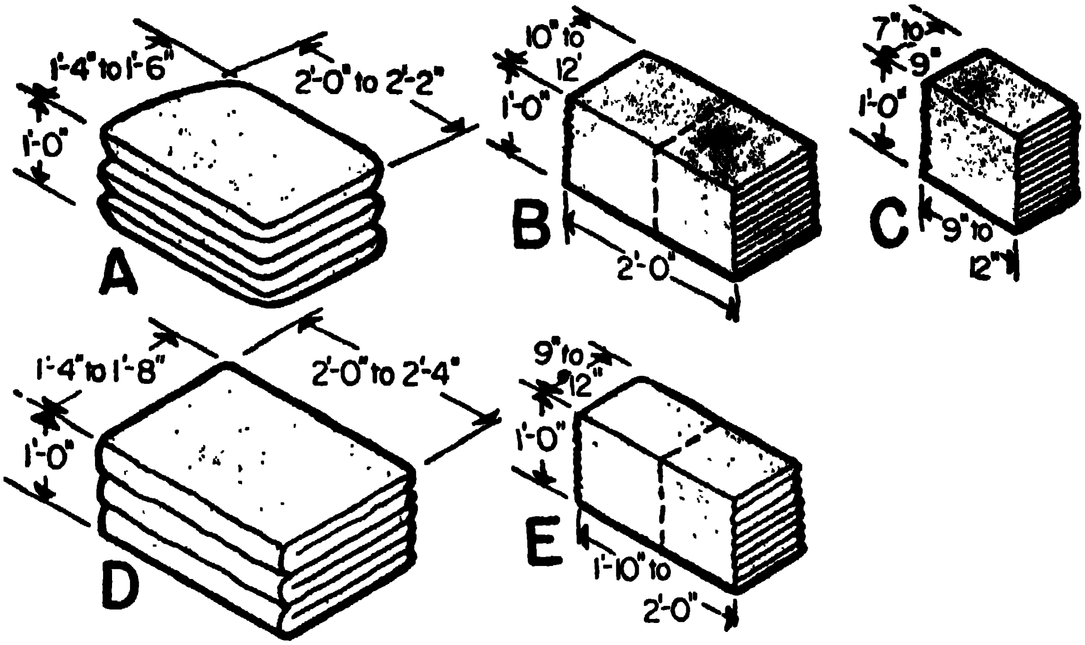
Built-in shelves, cabinets, and racks increase the utility of closets.



Left, linen should be stored on shallow trays. This keeps the linen sorted and prevents it from becoming rumpled in storage. This cabinet also provides locked storage for silverware and slotted storage space for serving trays. *Right*, a breakfast bar pulls out as shown here.

ARTICLE	WIDTH OF SHELF FRONT TO BACK: INCHES	LENGTH OF SPACE SIDE TO SIDE: INCHES	VERTICAL HEIGHT BETWEEN SHELVES: INCHES
For a man:			
Hat	14	12	8
Hat box	15	13	9
Cap	12	11	4
Shoes	13	9	7
For a woman:			
Hat	12	12	8
Hat box	14	14	9
Shoes	10	7½	7
For a child:			
Shoes	6–10	5½–7	

bedrooms is excellent for the bed linens. A sorting surface, approximately 36 inches high, is a convenience. Shelves or trays, adjustable as to distance apart, and approximately 18 to 24 inches deep and 36 inches long are recommended. Shelves above 72 inches high may be used for articles other than bedding, such as holiday decorations, wrappings and boxes, and textiles not commonly used.

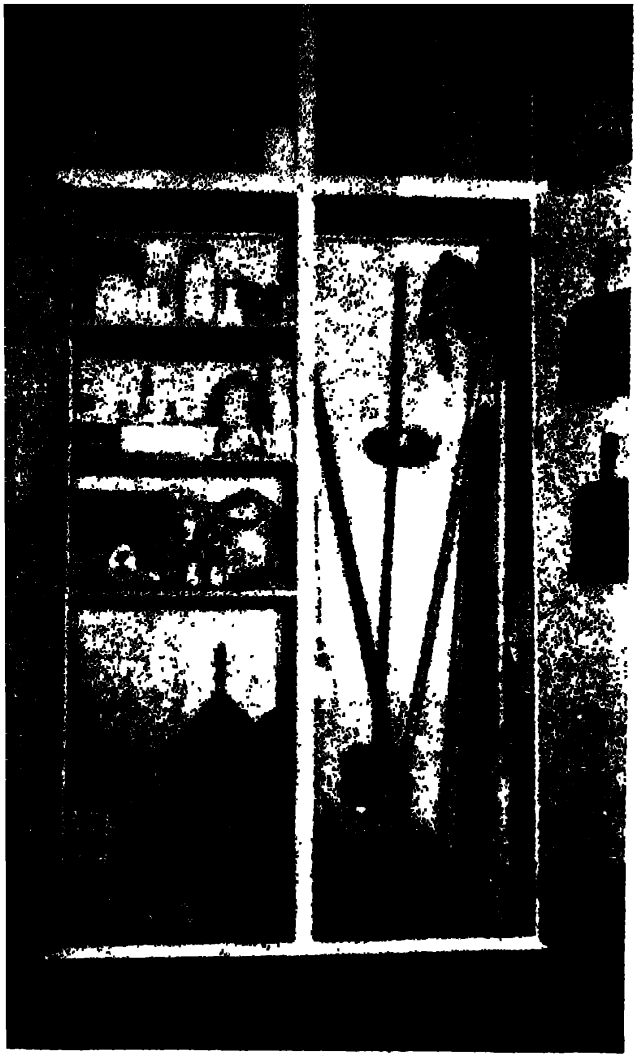


Courtesy *Architectural Record* combined with *American Architect and Architecture*

Average space requirements for the storage of some household linens: A, 3 pillows; *B*, 10 to 12 sheets, or 24 to 36 pillowcases; C, 12 to 18 small bath towels, or 18 to 24 face towels; *D*, blankets, 3 or 4 heavy, 4 to 6 light; and *E*, bath towels, 8 to 10 large, 16 to 20 medium.

Provision for the storage of cleaning equipment and supplies should be made as near to the place where the cleaning operation is done as is convenient. Generally, a location in or near the work area of the house is desirable. In large two-story houses, provision for storage of cleaning equipment secondary to the main storage space is advised for convenience in caring for the upper floor.

The amount of space required is dependent upon the number and size of the pieces of equipment used. Vacuum cleaners are known to require a floor space of about 16 inches by 14 inches, and to fill a height of 49 inches. Carpet sweepers require a floor space of about 14 inches by 10 inches with space above of 54 inches for the handle. Some cleaning equipment such as dust mops, wall brushes, brooms, and dustpans should hang when they are stored. Hooks for these should allow a clearance of 61 inches from the floor to accommodate the handles. The arrangement of all these



A well-planned cleaning closet provides adequate storage for present supplies and allows for future expansion of supplies.

pieces should be such that any article can be removed without moving any other one. Cleaning supplies, clean dust cloths and other small articles may be placed on a shelf over 61 inches from the floor. Cleaning closets or cabinets may range in size from 14 inches by 21 inches to 18 inches by 33 inches.

A supply of medicines, antiseptics, disinfectants, and certain appliances such as hot water bags and attachments, clinical thermometers, and others is common to most families. These should be assembled in a convenient place, accessible to the adult members of the family and out of reach of small children. A cabinet of convenient size with adjustable shelves and space to hang some of the appliances used by the family is desirable. If poisons are included in any of the medical supplies, it should be possible to segregate them from the nonpoisonous supplies. They may be locked in a separate compartment, placed on a special shelf, or marked by a pin or other sharp protuberance. A good location for a medicine cabinet is the bathroom. If toilet articles are also stored in the bathroom, separate cabinets for each should be supplied.

Truly the matter of planning and organizing storage space is important in the home, bearing as it does on the appearance of order, and the convenience of work spaces. When planning to build a new house, build planned storage spaces for everything in the house which will need to be stored. Many suggestions can be found as to arrangements and dimensions, but adaptations must always be made to any given situation. Adequate and satisfactory storage is on a par in importance in a smoothly running home with sufficient rooms, pleasant color combinations, and easy time schedules.

Suggested Activities

Select one or more of the following storage problems that may be inadequately met in your room or home and make detailed plans for the solution of the problem or problems chosen:

1. Storage of the personal belongings of a woman.
2. Storage of the personal belongings of a man.
3. Storage of the personal belongings of a child under eight years of age.
4. Storage of the staples used in a kitchen.
5. Storage of china, glassware, and silverware.
6. Storage of cooking utensils.
7. Storage of household linens.
8. Storage of cleaning equipment.
9. Storage of bedding.
10. Making a clothes closet in an old house a convenient place without the expenditure of much money.

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Problem 7. WHAT SMALL EQUIPMENT IS NECESSARY FOR FOOD PREPARATION?

Wise planning of the work centers in the kitchen requires that consideration be given to the utensils needed in carrying on the processes of food preparation. The number and size of the utensils regarded as necessary affect the amount of storage space to be provided and its organization. The list should be based on the extent and kind of cooking done in the kitchen. If little food preparation is done, the list of necessary utensils would be brief. If a new set of kitchen utensils is to be purchased it might be wise to select only a minimum number of pieces and add to them as the need appears. If a large number of seldom used pieces has accumulated over the years, it may not be amiss to sort out and withdraw from the active storage area or discard the pieces not being used. The size of the family, its interests and social activities are also factors affecting the items to be required in such a list. No such analyses are attempted here; however, the list in the following table, although not to be considered complete, may be suggestive in checking the adequacy of prospective purchases, or of a supply already on hand.

UTENSIL REQUIREMENTS FOR A FAMILY

Preliminary food preparations:

- 1 measuring cup (dry)
- 1 measuring cup (liquid)
- 1 set measuring spoons
- 1 set of 4 mixing bowls (½, 1, 3, 6 qts.)
- 1 set cookie cutters
- 1 food grinder
- 2 wire cake racks
- 1 fruit juicer
- 1 potato masher

1 rubber bowl scraper
2 teaspoons
2 tablespoons
1 wooden spoon
1 ladle
1 slicing knife
1 utility knife
2 paring knives
1 case knife
1 bread knife
1 pancake turner
1 short-handled fork
1 long-handled fork
1 apple corer
1 carving set
1 knife sharpener
egg beater
flour sifter
rolling pin
pastry blender
can opener
set of graters
slicing board
pastry board
1 colander
3 wire strainers
1 funnel

Top of range cooking:
3 sauce pans (1, 2, 4 qts.)
1 pressure sauce pan
1 kettle and draining lid (6–8 qts.)
1 double boiler (1½–2 qts.)
1 small frying pan (8 in.)
1 large frying pan (12 in.)
1 griddle
1 coffee maker
1 teapot

Oven cooking:
3 pie pans
2 layer-cake pans
1 square cake pan
1 tube cake pan
1 roaster or 1 roaster-broiler pan
1 casserole
8 custard cups
1 loaf pan
1 muffin pan
2 baking sheets

Storage containers:
1 set canisters
1 set salt and pepper shakers
1 bread and cake box
1 set refrigerator dishes
1 butter dish
1 vegetable bin

Clearing away:
1 dish pan
1 dish drainer
1 sink strainer
1 soap dish
1 vegetable brush
1 paper towel holder
1 garbage pail
1 wastebasket

Optional equipment:

- 1 household scales
- 1 quart measure
- 1 waffle iron
- 1 electric mixer
- 1 toaster
- 1 teakettle
- 1 set of thermometers
- 1 cookie jar
- 1 bean pot
- 1 kitchen stool

As one reads down this list the wide diversity of articles included cannot help but be impressive. There are articles for cutting—these must be sharp with a lasting edge; there are pans for cooking—these must transmit and hold the heat; and there are pans for baking—these must allow the formation of just the right crust during a period of baking adequate for the desired product. Generalizations are evidently impossible. It is necessary to consider each major item in some detail if the comments made are to be pertinent and pointed. Included under major items, by groups, are utensils for preliminary food preparation, such as paring knives, graters, choppers, beaters, measuring cups and the like; utensils for top-of-stove cooking; and utensils for oven cooking.

Measuring cups and spoons that have been accurately calibrated are necessary to measure the ingredients of carefully proportioned recipes. The United States Bureau of Standards has formulated in a Code of Specifications the requirements for measuring cups. The Code specifies that the standard measuring cup shall have a capacity of 8 fluid ounces or one-half of a liquid pint. Other specifications include the following: the top diameter of the one-cup type must not exceed 3 inches; the capacity must be indicated on the side in words; any pouring lips must not interfere with filling the cup to a graduation mark; a handle shall be provided on graduated cups. Other desirable characteristics not included in the Code are: The material should hold its shape and be heavy enough to balance the handle; the handle should be securely fastened and so fashioned as to be easily held; graduation marks should be included and should be easily cleaned. Aluminum, glass, and such composition products as casein and beetleware make good measuring cups.

Courtesy Corning Glass Works

Dry ingredients are measured in level-full cups.

Measuring cups are made in three styles including those for measuring:

1. Dry ingredients—measures a cup when filled to the top.
2. Liquid ingredients—measures a cup when filled somewhat below the top.
3. Fractional parts of a cup—separate cups for ¼, ⅓, ½, and 1 cup measures.

Measuring spoons should be calibrated in regard to the capacity of the tablespoon, which is $1/16$ of a standard cup. By common usage the teaspoon contains ⅓ of a tablespoon. Measuring spoons ordinarily are sold in clusters consisting of a tablespoon, a teaspoon, a half teaspoon, and a quarter teaspoon. They are frequently made of aluminum or a composition material and in all instances they should be strong.

The wise choice of knives and other cutlery presents an interesting problem. The differences in the appearance of a high quality knife blade and an inferior blade are so slight that on the basis of inspection only, it is difficult to pick out a superior product. The ability of the blade to take and keep

Courtesy Corning Glass Works

A large measuring cup adapts itself to many uses.

a good cutting edge depends upon the quality of the steel and the method used in forming the steel into the blade.

Only high carbon tool steel is used in making the best knives. The hardness and toughness of the steel resulting from heat treatment are determined by its carbon content and its freedom from impurities. The metal trade indicates the percentage of carbon in "points" or hundredths of a per cent. Steel of 100 points carbon has approximately 1 per cent carbon, while that of 70 points has 0.7 per cent. Steel with 100 to 110 points carbon is required for fine knives; that with 60 to 70 points is used for ordinary knives; and steel as low as 10 points carbon is found in inferior knives. The high carbon content produces a hard steel which is difficult to work into a blade, but which holds an edge well. High carbon steel produces a ringing tone when a blade is struck on the side. Some blades are marked "stainless" because they contain sufficient chromium or nickel to prevent rusting. Usually such knives have not enough carbon to keep fine cutting qualities of high carbon steel. A chromium plate has

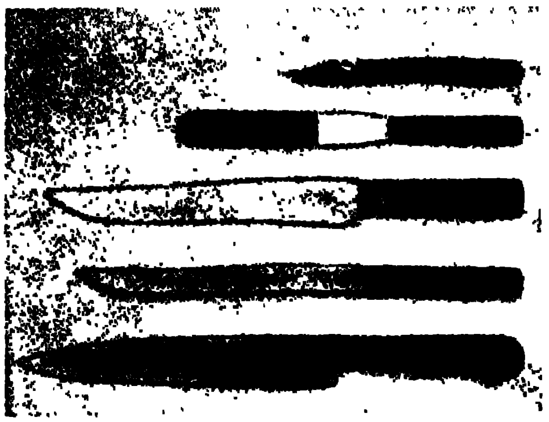
Courtesy Corning Glass Works

The large measuring cup is useful in making salad dressing.

been developed which combines resistance to stain with good quality carbon steel.

The best knife blades are forged or hammered from bars of heated steel. Forging produces a fine-grained metal which takes and holds a sharp cutting edge. A forged blade tapers in thickness from the handle to the point. Other methods of forming blades include beveling and stamping. Beveled blades are formed from a bar of metal thicker in the center and thinner at both sides. Two blades are cut at one time and taper from back to cutting edge in a manner similar to forged knives. This method is used for many medium priced knives. Stamped blades are cut from metal sheets. If the metal has a high carbon content the blade will give good service. They are uniformly thick except for a space about 3/16 of an inch from the cutting edge.

The handle is an important part of the knife. The shape and size of the handle affect the ease with which knives are used. In selecting a knife, test the handle to determine: Is the handle too short or too thin? In this case, the hand tends



Courtesy Better Buymanship No. 7. Copyright by Household Finance Corp.

Kinds of knives. *Top to bottom*: paring knife, narrow spatula, bread knife, slicer, cook's knife.

to slide down onto the blade. Is the handle awkwardly shaped or so small that the hand becomes unduly tired with long use? Is the feeling of balance between handle and blade good? When the balance is right, minimum effort is involved in directing the knife. The finish should be smooth and nonabsorbent. Fine-grained woods that do not split are satisfactory materials for knife handles as well as synthetic materials and metals. The tang of the blade should be held securely in a split handle or between the two halves of the handle by means of two or more rivets. Tubular rivets are superior to wire rivets as they prevent the handle from warping or opening up and becoming a dirt catcher. A tubular rivet can be identified by its large head.

The handle and blade joinings should strengthen the union of the handle and the blade and prevent dirt from lodging there. The best joining is a shoulder which is forged as a part of the knife blade. The bolster is a collar of metal attached to the blade and serves as a protection to the handle. The ferrule may be only a thin, pressed-metal collar slipped over the end of the handle to hold the blade in place.

The cutting quality of a knife is determined by the bevel or slant of the cutting edge. This varies from the bevel of about 15° to 19° on paring knives to the bevel of 17° to 25° on large cutting knives.

Carbon steel blades should be sharpened with a gradual taper toward the cutting edge. Stainless steel blades must have a short, blunt taper or bevel, because the edges are soft and would be dented and turned too easily if sharpened with a long bevel. Bevels may become worn off, or ragged and turned back from use and must be restored by a knife sharpener. The classes of knife sharpeners include those which are used to re-align the cutting edge of a blade, as with the sharpening steel, and those which regrind the cutting edge. Of these, there are the fast-cutting stones, such as the hand abrasive stone, abrasive grinding wheels, and abrasive discs; the slow cutting or fine stones, such as "oil stone"; and steel discs. Only a high quality knife can be successfully sharpened with a sharpening steel, as the principal function of the steel is to re-align or straighten up the cutting edge when it has been bent over by use. When once properly ground a blade needs to be reground with stone or grinding wheel only at infrequent intervals. Such grinding should never be attempted by a novice. Sharpening steels come in varying degrees of fineness or knurling. A finely knurled or almost smooth steel is preferred to reset a high carbon content knife in constant use. A more coarsely knurled steel is preferred by those who do not give the knife hard usage and who wish not only to reset the edge but also to give some slight grinding effect.

The proper method of using a sharpening steel is to hold it in the left hand with the point upward. Starting with the heel of the knife (the end of the cutting edge near the handle) at the point of the steel, the blade, with cutting edge toward the handle of the steel, is drawn for its entire length across and *down* toward the handle of the steel, first on one side of the steel and then on the other. Very little pressure is needed. If the blade is held against the sharpening steel at about a 20° angle it brings the steel in flat contact with the beveled cutting edge. The left hand should be protected from the knife by a guard on the handle of the steel. Frequent use of a steel to re-align a properly ground cutting edge is recommended. When the use of a steel fails to resharpen the knife, then the knife must be sharpened on a fine oilstone, unless the edge is in such bad condition that grinding with a coarser abrasive is necessary.

Of the fast-cutting stones, abrasive sticks are used in the same way as a steel. Most of these sticks are made of aluminum oxide crystals held together with a cementing substance. They have fast-cutting properties and should be used only sparingly with high-quality knives. Abrasive grinding wheels cut away the blade of the knife and require much skill to operate so as to obtain the desired results. They should rarely be used by the housewife and then only when the knife is exceptionally dull. When sharpening with abrasive disc sharpeners, the cutting edge of the knife is placed between two discs or wheels. The discs should be so shaped as to preserve an approximation to the original bevel of the blade. This method offers an easy way of sharpening the cheaper type of knife and gives satisfying results. It should not be used on the better type of knife.

Steel disc sharpeners consist of two series of intersecting steel discs, each harder than the knife which they are intended to sharpen. A variation of the disc type consists of steel rods set in the shape of a "V" through which the knife is drawn. Either type tends to shave the steel from the two faces of the edge of the knife simultaneously in minute chips or shavings. High quality knives are not effectively sharpened by this tool.

A scrutiny of the list on page 419 will indicate the kinds of knives needed. *Paring knives* are among the knives found in every home. There are several types of these. For ordinary cutting or peeling and for slicing articles held in the hand, the blade of a paring knife should have a straight cutting edge, a sharp point, and be about 2½ to 3 inches long. Another type for paring round fruits and vegetables has a thin blade with a slight concave curvature to the cutting edge. A paring knife with a rocker-shaped blade from 2½ to 4 inches long may be used for cutting down or mincing vegetables on a board, for general peeling, and for slicing. The following list of descriptions of other types of knives may facilitate their ready recognition:

The slicing knife has a thin, narrow, flexible blade 8 to 8½ inches long, with a blunt or pointed end.

A cook's knife has a stiff blade 8 inches long with a narrow point and deep choil or heel. This is the best general large knife for kitchen use. There is room under the handle for the fingers as it is used for chopping.

The bread knife has a thin, broad, flexible blade, 7½ to 8 inches long. A blade with a sharp, finely serrated edge is desirable as it will cut the bread without tearing and is self-sharpening. The cross section should show a taper from back to cutting edge. The steel should be harder than for most knives because the cutting of bread dulls a blade rapidly.

The butcher knife has a heavy, stiff blade about 7 or 8 inches long with a sharp point and curved cutting edge. It is used for heavy cutting.

The carving knife has a rather stiff blade which makes it easy to cut hot, soft, yielding meat. The length is about 8½ to 9 inches. There are three kinds: meat, game, and steak. Cold meat can best be sliced with a flexible, thin blade.

A properly designed *grapefruit knife* has a thin, flexible blade about 3½ inches long, curved to conform to the shape of the fruit so as not to puncture the skin as the fruit is being cut away from the skin.

A steak knife has a flexible blade and a curved tip. The blade is usually about 5 inches long.

A skinning knife is used on the farm for butchering. It has a strong, stiff, narrow, pointed blade about 6 to 7 inches long.

The utility, or boning, knife has a semiflexible pointed blade. It is used for boning fowl and ham, and for slicing fruit and vegetables. The blade is 4¾ to 6 inches long.

The narrow spatula has a flexible blade from 4½ to 8 inches long with the greatest flexibility at about one-third of the distance from the end. It is used for cleaning bowls, removing cake or muffins from pans, leveling off measured dry ingredients and other things.

The broad spatula is more rigid than the narrow spatula. It may replace the pancake turner, remove cookies from the baking sheet and do other useful tasks.

Kitchen forks are of various sizes. They may have two, three, or four prongs, depending upon the use to which they are to be put. A long-handled fork is used in a deep kettle or with large and heavy objects. Smaller forks are needed when cutting meats or skinning vegetables. The tines should be firm and sharp. The joinings and handles on forks used should have the same characteristics as have been recommended for knives.

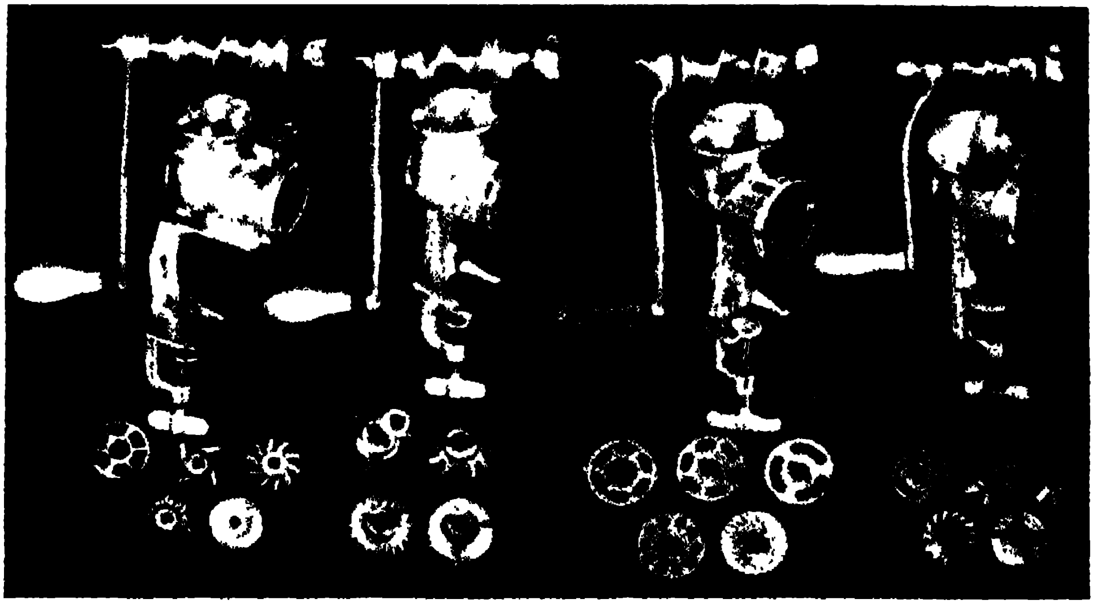
Spoons for mixing, stirring, and serving are made of aluminum, tin, plated iron, enamelware, plated silver, and wood. Aluminum spoons are brittle and will not stand bending. Tin spoons discolor easily and all-metal spoons scratch the container when they are used for stirring. Wooden spoons do not mar the container and do not become warm in hot mixtures, hence they are preferred for beating and stirring. They are often stiff and awkward in shape, but with thoughtful selection well-shaped ones may be obtained.

All kitchen cutlery should be stored carefully. Putting all kinds together in a drawer tends to nick the edges and break the points. Partitioned, grooved drawers are excellent for knives. A knife blade should never be heated to a high temperature as the temper is destroyed. It must then be specially treated before it can be sharpened. Bone-handled cutlery, as in carving sets, should be washed quickly in cool water to prevent removing the oil from the bone.

Slicers, shredders, and graters are cutting devices used for dividing firm foods into small pieces. The metal used for them varies from thin tinned sheet steel to forged steel reinforced with wire heading. The cutting edges made from thin sheets bend and dull easily, while those pressed from the heavier sheet metal are strong enough to maintain their shape and retain their appearance, despite frequent use. The width and length desired in a slicer, shredder, or grater depends upon the size of food to be used. Large vegetables such as cabbage require from three to five inches.

Slicers have from one to five parallel knives 1½ to 4 inches long. Inexpensive slicers designed for occasional use consist of a metal sheet in which slits are made and the material on one side of the slit raised and sharpened to form the cutting edge. More durable slicers consist of metal blades set in wooden frames which may be adjusted for slicing foods in different thicknesses.

Shredders consist of round holes, ⅛ to ¼ inch across, which are cut in thin sheet metal. A portion of metal at the bottom



Various types of food grinders. The first grinder is easily cleaned. Note the drain for juices. The second grinder has a stationary cutting knife. All the knives in the third grinder are removable. The fourth grinder, which is smaller than the others, also opens for ease in cleaning.

of the hole is raised to form a cutting edge. As food is drawn over the knives it is cut into long slivers. This method of cutting is quickly done and gives interesting variety to salads and French fried foods.

The cutting edges of graters are made by cutting crosses or star-shaped cuts in the metal and punching the corners through. Large cuts make coarse graters and smaller cuts make fine graters. Only solid body foods can be cut by graters. Grated foods make interesting garnishes.

Food choppers, like the other cutting devices, are used to reduce large pieces of food into small pieces. The finished product as it comes from the chopper should be firm and clean cut, not crushed, mashed, or torn. The extent of crushing depends upon the character of the food cut, as well as upon the sharpness of the chopper knives. Food choppers are made of cast iron heavily tinned to give a surface which is smooth, easily cleaned, and noncorrosive.

A food chopper consists of the body, feed worm or forcer, knives, handle, and the screws and nuts which hold them all together. The body consists of a cup-shaped hopper into which the food is fed, and a corrugated barrel which helps to sever the large pieces of food and to guide them to the knives. The feed worm or forcer fits into the barrel. The threads are large at the back to receive the large pieces of food, and smaller at the front to hold the food firmly and rigidly as it is forced through the stationary knife for cutting. A double thread placed at the front is more effective in holding and forcing the food. Two knives, a stationary and a rotating one, are located at the end of the forcer. Either one or both may be removable. Each should be of hardened steel so that it will hold an edge for cutting. Several sizes of rotating knives come with each chopper and cut food into different sizes. The handle fastens at the end and operates the worm. It should be long enough to give a good mechanical advantage and the hand piece should be comfortable.

Food choppers may be cast with a small opening in the back for the shaft of the feed worm, in which case the back is built high and little juice drips out during the grinding process. Some choppers are cast with such a large opening for the shaft that it occupies practically all of the back. In such cases much dripping is to be anticipated. The body of food choppers is often so designed that only low dishes can be used to receive the food as it comes from the chopper. Higher bodies would make possible the use of larger receptacles and thus contribute to the convenience of the worker.

Beaters are used in the home for three specific purposes. These include: incorporating air into a liquid by the process of emulsion, as in beating egg whites or cream; developing a fine texture, as in reducing curds in overcooked custards or lumps in white sauce; and mixing ingredients, as in making mayonnaise. Some, but not all, beaters can be used for more than one of these purposes.The general types of beaters are whisk and rotary. The whisk beater is especially designed for incorporating large quantities of air into a liquid whose viscosity is great. It is not successfully used to mix ingredients. The texture of the beaten product is apt to be coarse. The whisk beater is made by interweaving wire across a frame

Courtesy Corning Glass Works

Some cooking utensils may be used for serving dishes.

made in the shape of a spoon. The interwoven wires may be fine or coarse and they may be interlaced, twisted, or coiled. The finer the wires and the greater their number, the greater the anticipated volume. The whisk should be substantially built and the handle should be durable and easily held.

Rotary beaters are used both for developing fine textures and for mixing. They do not produce as large a volume as the whisk beaters, but they give a finer texture. Two or four blades rotate on each of two pivots. Additional stationary blades add to the effectiveness of beating. The thinner the blades and the greater the number, the greater the volume and the finer the texture of the product. The beater blades should fit close to the bottom of the bowl so as not to leave unbeaten material. A drive wheel at the top meshes with gears at the top of the blades. The drive wheel should be securely fastened so that it does not slip out of gear. In large beaters ball bearings are used on the drive wheel to reduce friction and make the beater easier to operate. The handle on the drive wheel should be large enough for ease in handling. In addition to these points, the holding handle is also impor-

CHARACTERISTICS OF COOKING UTENSILS

Material	Weight	Heating Qualities and Recommended Uses	Appearance	Durability	Care
Porcelain enamel	Light	Develops hot spots which readily scorch foods. Good for sauce pans and double boilers. Poor for baking. May be used for large roasters where long slow cooking is required.	May be had in many colors to match kitchen design. High color should be served for outside. Low grades may have blisters which splinter off. High quality well-designed and made to fit heat units on ranges.	Chips from blows and quick changes of temperature. Chemicals in high color on inside of pans may be harmful to food.	Should be washed carefully with hot soap suds, making sure to remove all foods and to rinse off soap suds. These form a slight stain which deepens with use. Rubbing on baking soda removes many such stains. Mild abrasives can be used on it. Food burned on should be removed by soaking or simmering in water to which a little soda has been added. A wooden spoon should be used for stirring as a metal spoon makes dark marks.
Aluminum cast	Heaviest weight of aluminum but relatively light to lift.	Rapid, even heat distribution. Holds heat. Good for skillets, pressure sauce pans, Dutch ovens.	Sturdy. Utensils made from this material usually have good design and are made to fit heat units or oven. Outside may be polished, burnished, or chromium plated.	Does not dent, rust, or chip. Good quality can be made to retain brightness. Poor quality pits and discolors readily. Stained by alkalies such as harsh soaps, soda, and hard water. Strong food flavors and odors are ab-	Should be washed carefully with hot soap suds, making sure to remove all trace of food and to rinse off soap suds. Dry thoroughly, especially if the water is hard. Dark stains can be removed by boiling weak vinegar solution or acid fruits as apples or rhubarb in utensil. Light stains can be removed with steel wool or other mild abrasive.

Continued on page 425.

CHARACTERISTICS OF COOKING UTENSILS—CONTINUED

MATERIAL	WEIGHT	HEATING QUALITIES AND RECOMMENDED USES	APPEARANCE	DURABILITY	CARE
				sorbed in invisible pores. Application of uneven heat may in time warp it.	Remove burned-on food as above. Should be heated to high temperature and stored with lid ajar or removed after use with strong-flavored foods. High polish on outside can be restored by occasional use of silver polish.
Aluminum sheet	Lighter than cast aluminum. There are several weights or gauges in this type.	Rapid, even heat distribution. May be too rapid for high heat. Good for sauce pans, double boilers, kettles, baking sheets, bread pans, roasters, coffee makers.	Heavy gauges usually have good design and are made to fit heat units on ranges Some have a special finish called Alumilite which is stain resisting and does not smudge china, linen, or porcelain enamel.	Light gauges may dent or warp easily. Stains as above. May appear dull with use.	Wash and dry as above. Remove stains as above. Remove burned on foods as above. Rapid change of temperature may cause warping. Cold water should never be placed in a pan recently removed from heat.
Stainless steel	About like sheet aluminum	Rapid, even. Brown evenly. Good for frying pans. sauce pans, double boilers, baking sheets, bread pans, coffee makers.	Usually well-designed. Made to fit heat units on ranges. Has its own characteristic appearance.	Does not chip, dent, rust, warp, stain, or become dull appearing. Withstands intense heat but may discolor slightly.	Should be washed with hot soap suds making sure to remove all traces of foods and to rinse off soap suds. Mild abrasives may be used. Remove burned on foods as above.

Continued on page 426.

CHARACTERISTICS OF COOKING UTENSILS—CONTINUED

MATERIAL	WEIGHT	HEATING QUALITIES AND RECOMMENDED USES	APPEARANCE	DURABILITY	CARE
Glass	Medium to heavy	Slow, even. Special qualities required for surface cooking. Good for casseroles, custard cups, coffee, and tea makers.	Usually well-designed. Made to fit heat units on ranges. Permits watching food while cooking. Can be kept sparkling in appearance. Surface utensils have some mark of identification on them.	May crack or break from blows or from sudden temperature changes.	Wash as above. Remove burned-on foods as above; may be necessary to immerse oven ware in another pan for this. Special surface ware required for surface cooking. Hot utensils must not be set on cold surfaces and must not have cold water poured into them.
Earthenware, chinaware	Medium to heavy	Slow, even. Usually best for oven cooking. Some surface utensils have been developed. Retains heat. Good for bean pots, casseroles, custard cups, teapots.	Usually well-designed. Comes in many attractive colors.	May crack or chip from blows or from sudden temperature changes. May craze in time.	Wash as above. Remove burned-on food as above. Must not be cooled suddenly. Must not be heated unevenly.
Cast iron	Heavy	Slow, even. Retains heat. Suitable for skillets, Dutch ovens, deep-fat frying kettle.	Dark. Sturdy. Design is simple.	Does not dent or warp. Rusts if put away damp or salty. Food flavors and odors are absorbed.	Wash as above. Remove burned on food as above. Can withstand harsh abrasives. Remove food flavors and odors as for cast aluminum. May have to be seasoned by rubbing in unsalted oil and warming.

Continued on page 427.

CHARACTERISTICS OF COOKING UTENSILS—CONTINUED

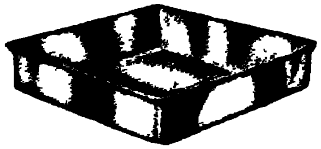
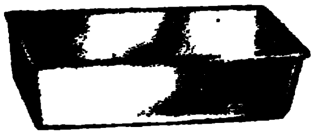
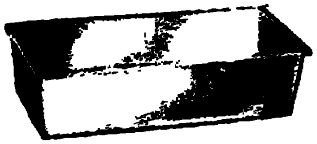
Material	Weight	Heating Qualities and Recommended Uses	Appearance	Durability	Care
Sheet iron	Medium	Rapid, even. Good for lightweight skillets and frying pans.	Medium dark. Sturdy. Design is simple.	Tends to buckle and warp with use.	Wash as above. Remove burned on food as above. Can withstand harsh abrasives. Must be put away dry.
Russia iron	Light	Rapid, even. Good for baking sheets, bread pans.	Smooth, black.	Retains shape. Withstands heat. Does not rust.	Wash as above. Remove burned on food as above. Harsh abrasives will remove the oxide coating. Should be put away dry.
Copper	Light to medium	Rapid, even. Cools rapidly. Good for sauce pans, skillets, tea kettle, candy kettles.	Usually has a lining of tin or chromium which is fused on. Usually has good design.	Fused linings may peel with high heat. Tarnishes readily. Withstands hard use.	Wash as above. Remove burned on food as above. Should be kept bright, clean, and scoured, as tarnished copper forms poisonous copper compounds.
Tin	Light	Rapid, even. Good for cake, pie, cookie, muffin, and biscuit pans.	Bright when new, but tarnishes soon. The tarnish should not be removed.	Durable as long as the tin is not worn off, scratched, or dissolved off.	Wash as above. Remove burned-on food as above. Tarnish should not be removed.

tant. Metal holding handles are usually thin and narrow and difficult to grasp. Other holding handles are of wood, shaped in a tee or knob, or like a shovel handle. They should be tested in the hand before buying. A good beater works quickly and easily. It operates with a minimum amount of noise, is easy to clean, is rustproof and substantial.

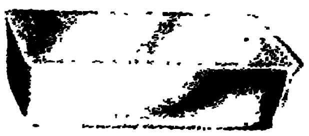
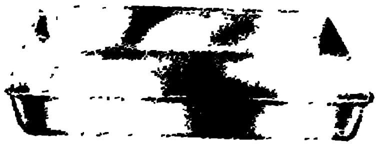
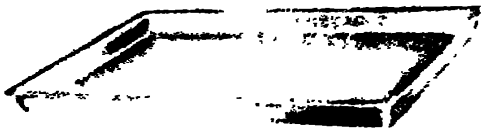
Cooking utensils for use on surface burners or in the oven are made of many different kinds of materials, no one of which can be said to be superior in every respect. The suitability of any material for this purpose depends upon its ability to absorb heat. The surface finish given a material increases or decreases the amount of heat absorbed. A polished metal reflects some heat and a dark finish absorbs heat rapidly. The characteristics and suggested uses of some materials for cooking utensils are shown on pages 429 to 432.

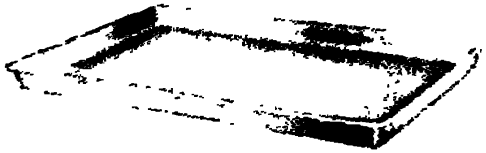
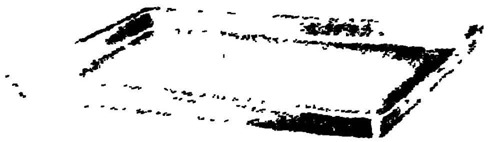
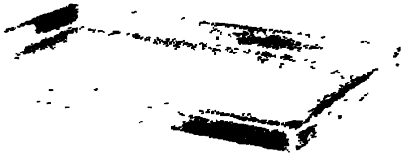
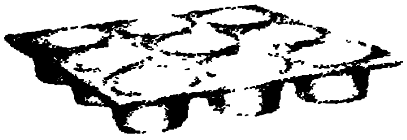
Other features also contribute to the effective use of pans used in cookery, and to convenience in handling them. The size of a pan should be chosen in relation to the amount of food to be cooked in it. Pans with flat bottoms large enough to completely cover the flame, or burner, are more economical of heat energy than utensils with small or rounded bottoms. Straight-walled utensils, because of their smaller radiating surfaces, are more efficient than bulging or flaring ones. The shape of the pan may also affect the evenness of baking of certain relatively flat baked products. Cookies, cream puffs, biscuits, and other flat baked products rise and brown more easily when cooked on baking sheets than when cooked in deep-sided pans. The sides on a pan act as a baffle to heat, and the bottom browns before the top is the desired color. The effect the shape of the utensil has on ease of cleaning it is important. Freedom from seams, grooves, sharp edges, and corners is important if the utensil is to be easily cleaned. Rounded corners between the sides and the bottom of any pan are easily cleaned, and make stirring more effective. The edges of cookery utensils are either turned, rolled, or rimless. If turned or rolled, the finish must be smooth with no splits or cracks to collect dirt. Lips on opposite sides of a pan are convenient for pouring with either hand. Covers

UTENSIL GUIDE FOR GOOD BAKING

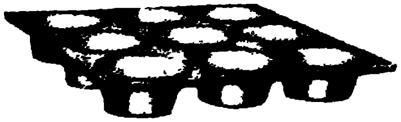
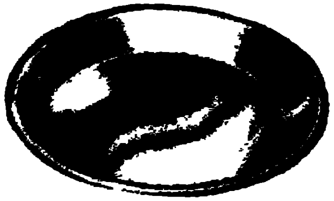
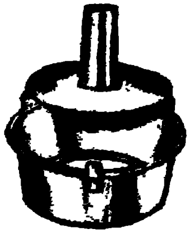
Product to Be Baked	*Baking Utensil*	*Size*	*Batter Capacity*	*Average Baking Temp.*	*Average Baking Time*
Cakes					
Round Layer Cake		8″ round 9″ round	2 cups flour—3 layers 2 cups flour—2 layers	350°–375° F. 350°–375 F.	20–25 min. 30–35 min.
Square Layer Cake		8″ x 8″ x 2″ 9″ x 9″ x 2″	2 cups flour—2 layers 3 cups flour—2 layers	350° F. 350° F.	40–45 min. 45–50 min.
Loaf Cake		10″ x 5″ x 3″	2 cups flour	350° F.	50–60 min.
Fruit or Nut Breads		10″ x 5″ x 3″	2¼ cups flour	350° F.	65–75 min.

UTENSIL GUIDE FOR GOOD BAKING

Product to Be Baked	*Baking Utensil*	*Size*	*Batter Capacity*	*Average Baking Temp.*	*Average Baking Time*
White Bread		10″ x 5″ x 3″	3 cups flour	400° F.	45 min.
Sheet Cake		9″ x 13″ x 2″	3 cups flour	350° F.	45–50 min.
Fruit Dumplings		9″ x 13″ x 2″	Crust—2¼ cups flour Filling—6 apples or peaches	425° F.	40–50 min.
Cobbler		9″ x 13″ x 2″	Crust—3 cups flour Filling—6 cups	350° F.	30–45 min., depends on fruit
Jelly Roll		10″ x 15″ x 1″	1 cup flour	400° F.	12–15 min.

Product to Be Baked	*Baking Utensil*	*Size*	*Batter Capacity*	*Average Baking Temp.*	*Average Baking Time*
Sheet Cookies		10″ x 15″ x 1″	24 2″ cookies	325°–375° F.	20–30 min.
Biscuits		10″ x 15″ x 1″	2 cups flour— 19 2″ biscuits	450° F.	12–15 min.
Raised Rolls		10″ x 15″ x 1″	3 cups flour— 1½—2 doz.	425° F.	12–15 min.
Drop		10″ x 14″	9 2″ cookies	Follow recipe	Follow recipe
Refrigerator		12″ x 15″	12 2″ cookies		
Rolled		14″ x 17″	14 2″ cookies		
Cup Cakes		12 cups	1 cup flour	350° F.	25 min.

UTENSIL GUIDE FOR GOOD BAKING

Product to Be Baked	*Baking Utensil*	*Size*	*Batter Capacity*	*Average Baking Temp.*	*Average Baking Time*
Muffins		12 cups	1¾ cups flour— 12 muffins	425° F.	20–25 min.
Pie		9"	Crust: Single 1¼ cups flour Double or lattice 2¼ cups flour—Filling 4 cups	450° F. 425° F.	12–15 min. 40 min.
		10"	Crust: Single 1⅓ cups flour—Double or lattice 2½ cups flour Filling 5 cups	450° F. 425° F.	12–15 min. 40–50 min.
Sponge or Angel Cake		10" x 4"	1¼ cups flour	325° F.	55–65 min.

All cuts courtesy The Aluminum Cooking Utensil Company must fit snugly to prevent the escape of steam. To do this either the pan or the cover must have a beveled edge.

Cooking utensils which have handles should have them securely fastened so they will not loosen. They should be welded with a smooth joint and no hollow places should be left to collect dirt. Heat-resistant materials, such as bakelite, hollow metal, or wood, are best for handles. Wooden handles must be protected with a metal shank to prevent them from catching on fire from the open flame. The shape and length of handles on cooking utensils should make the hand comfortable. A handle too long may protrude in the way, or it may overbalance the pan. The hand may come in contact with the pan if the handle is too short. Handles may be joined to the pan almost at right angles or at various acute angles. Large kettles may have bails and rings instead of handles, but such utensils are difficult to manage if hot liquids must be poured from them.

Pressure sauce pans that are efficient and yet simple to use are now on the market. Although pressure sauce pans are of many shapes and designs all have the same elements. Essentially they each consist of a sturdy pan with a cover fitting tightly enough that a pressure of 15 pounds can be built up inside it. At this pressure, steam in the pan is heated to temperatures above the boiling point of water. This enables food to be cooked in far less time than is required when boiling water is used. The cover seal may be formed in one of two ways, depending upon the design of the pan. The cover may be made of flexible metal which can be slipped under the rim of the pan and flattened out smoothly as the handle of the lid is brought in line with the handle of the pan and hooked over it. Or the lid may fit down onto a bevel around the rim of the pan and screw into place. Most pressure sauce pans have a synthetic rubber gasket to facilitate a complete seal.

The cover has an opening through which air escapes while the pan is heating up and some device to cover this opening later in order to develop the pressure to the proper level. This device may be a free weight, a semifree weight, or a pet-cock to close the hole. The cover may also have another opening serving as a safety device in case of violations of the instructions. This opening is stopped with a synthetic rubber plug or a plug of fuseable metal. The first blows out and the latter melts out at the high temperatures accompanying high pressures.

Pressure sauce pans are useful for the following:

1. Reducing cooking time for long-cooking vegetables, fruits, cereals, and meats.
2. Reducing cooking odors in the preparation of such foods as cabbage, cauliflower, onions, and others.
3. Retaining a maximum of flavor and often of vitamin content.

Pressure sauce pans are of little use for the following:

1. Cooking foods that normally require but a short time, or which are variable in their time requirements.
2. Duplicating any method of cooking other than boiling or steaming.
3. Cooking small amounts of food.
4. Cooking foods that tend to froth.

Special directions are given for cooking time, methods of bringing the contents up to pressure, and of reducing the pressure. These must be followed to the letter if time is to be saved and a good product be developed.

Suggested Activities

1. Determine the cost on the local market of kitchen utensils commonly used by your family. Use the suggested list on page 411 as a beginning. Strike out any utensil not desired and add others you consider necessary. Collect information in a form similar to:

ITEM	PRICE	STORE	COMMENTS
1 measuring cup (dry) . . .	$ .13	Woolworth	Aluminum
1 " " (liquid) . .	.50	Waters	Glass, red lettering
1 set measuring spoons . . .	.25	Waters	Aluminum
1 set mixing bowls	2.50	Crosby	Earthenware, various colors

2. Plan convenient storage of these utensils according to the principles set forth in this unit.

3. A sharp blade enhances the value of a knife. Various devices aid in producing and keeping a sharp edge. Examine each of the following sharpeners to determine its functions: steel, carborundum stick, whetstone, grindstone, steel beveler, other. Sharpen a dull knife using appropriate knife sharpener.
4. How may knives be stored to keep them in good condition?
5. Examine and compare several egg beaters. Beat an egg white or some other suitable substance for one minute or long enough to reach a maximum volume. Record the following information: type of beater, volume of egg white before beating, volume increase, texture, noise of using, ease of using, substantialness of beater.
6. Examine food grinders to determine the characteristics that make for convenience.

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UNIT FIVE

◆◆◆◆◆

The House: Its Fundamental Equipment

WHEN a house is being built for the purpose of becoming a home, completion of the outer shell does not necessarily qualify it for that purpose. Certain facilities in the house contribute toward making it a place where healthful, convenient, and economical living can be carried on. Such facilities, termed fundamental equipment, include the finishes of wall, floor, and work surfaces; the means for supplying water and disposing of waste; the equipment for controlling temperature, humidity, and air movement; and provision for adequate illumination.

Each of these types of items is unique and important in making the house a more satisfactory background for home life. The kind of finishes chosen for walls, floor, and work surfaces determines the attractiveness of the house, the ease with which the house can be kept clean and sanitary, and may affect the necessity for using family funds for replacement. It is a commonly accepted fact that the presence of running water in the house and adequate means for disposing of waste reduce the amount of labor required for running the household and make the maintenance of health an easier problem. The equipment for controlling temperature, humidity, and air movement is chosen because of the comfort which will be given to the occupants of the house. The control of the conditions of the air may be only for heat or may extend to cooling, humidifying, or dehumidifying, and to the circulation of air. The need for conserving eyesight, giving cheer, and preventing accidents is justification enough for supplying means for adequate illumination.

Much equipment, fundamental and otherwise, is available for the home. Obviously not all equipment is suitable for every situation. The purpose of this unit is to describe the general characteristics of fundamental equipment so that better choices may be made for a particular house.

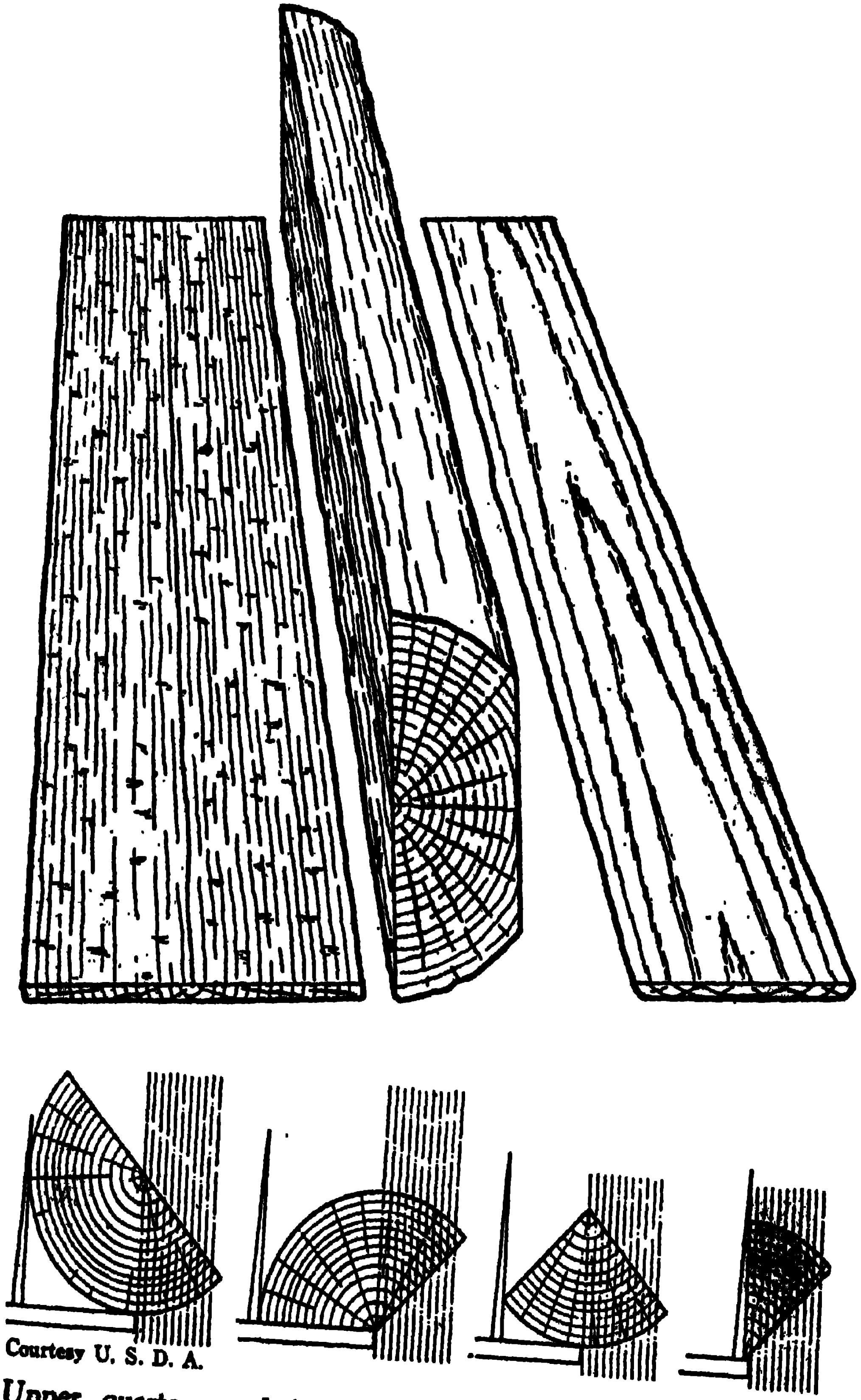
Problem 1. WHAT WALL, FLOOR, AND WORK SURFACE FINISHES ARE SATISFACTORY FOR THE HOUSE?

When choosing materials and finishes for floors, work surfaces, and walls there are a number of characteristics that affect their desirability for each of these purposes. Generally speaking, materials and finishes should be durable, easily cleaned and kept clean, and attractive. They should be resistant to scratching, acid, alkali, and other organic solvents commonly found in the home. Seams must be as tight as possible or eliminated entirely. The surface must be smooth, usually somewhat resilient, and nonslippery. Color and bright surfaces add much to the appearance. Materials used for floors include wood and its finishes, such as paints, varnishes, and waxes; synthetic floor coverings such as linoleums, felt bases, rubber, and asphalt and ceramic tiles. Materials used for work surfaces include most of those used for floors and also porcelain enamel and the nickel and chromium alloys such as stainless steel and Monel metal. Materials used for walls include paints using either an oil or water for thinning, wall paper, and some lightweight linoleums or oil cloth. In addition, certain of the plastics are having use for these and for some of the items known as hardware.

In this country wood is a popular material for floors, casings, cabinet work, and, in some cases, for walls. The framework of built-in cabinets is likely to be made of wood although other materials may finish the most used parts. An understanding of the kinds of woods, their uses, and their finishes is important if wise choices are to be made.

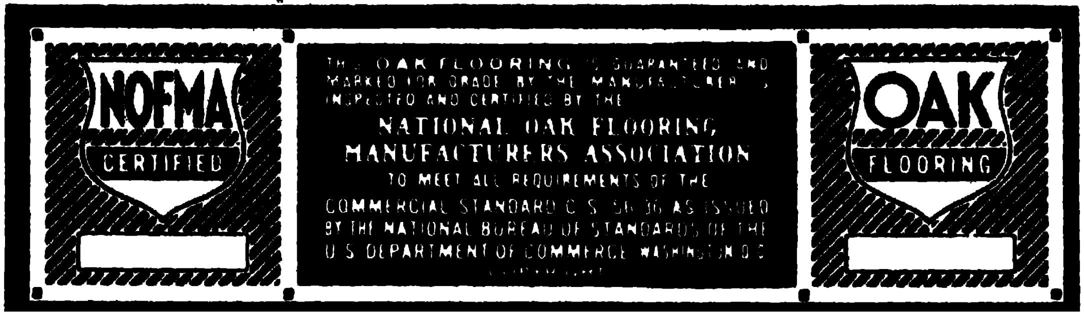
Woods are commonly classified as hardwoods and softwoods. These are trade terms and may be misleading because some of the so-called softwoods are harder than some of those classed as hardwoods. Another basis of classification is porousness of grain; varieties of wood are said to have open or closed grains. This second classification is useful in judging woods used in cabinet making and other places where a smooth finish is desired. The hardwoods are sawed from the deciduous trees and include oak and maple, which are most used, and birch and beech, which are used to a limited extent in certain regions. The so-called softwoods are sawed from the various kinds of conifers, such as pine, fir, spruce, redwood, and cypress. In general, the hardwoods make better floors than the softwoods, because they wear more evenly, are less likely to sliver, take a more durable finish, and are more attractive in appearance. Although they are usually more expensive than softwoods, this is offset by their superior wearing qualities. Softwoods may be used for casings, especially if the finish is to be paint or enamel.

The manner in which wood is sawed has much to do with the beauty of the grain and the durability of the surface. As the tree grows, layers of wood are added to the outer rim each year by the growth of additional cells. These layers form concentric circles called annual rings. When the tree is cut into boards, the annual rings form a pattern in the board known as



Courtesy U. S. D. A.

Upper, quarter-sawed (*left*) and plain-sawed (*right*) boards cut from log. *Lower*, methods of cutting quarter-sawed boards.



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the grain. Two methods of sawing are used, plain sawing and quarter sawing. Plain sawing begins at the outer edge of the log where the outlines of the annual rings are somewhat irregular. This usually produces a pattern of great beauty, but because the annual rings are thin at the edges, wear brought on by pressure may cause them to sliver. When quarter sawing is done the logs are first cut into quarters and then the saw cuts are made as nearly as possible at right angles to the annual rings. This produces a grain which is striated in appearance and durable to wear from pressure.

Hardwoods such as maple, oak, chestnut, and birch, used extensively for flooring, are usually finished by sanding, filling, and coating with varnish or shellac. Some fillers seal the pores and give a desirable surface finish, more durable than the finishes mentioned above. The floor finished by any of these materials may then be covered with a thin film of wax and polished. Any waxed surface should be dusted with an untreated mop, as oil tends to soften wax and thus reduces its luster. Hardwood floors may be left uncovered in any room in the house or partially covered with rugs in dining room, living room, bedroom, or hall.

Softwoods such as pine, fir, redwood, or cedar may also be used for floors. They may be finished in the same way as the hardwoods. They may be oiled with a mixture of linseed and turpentine, or they may be painted. The latter method is the least durable to wear even when a special floor enamel is used, and in most cases is used only on floors that have been stained so that other methods are not suitable. When a floor is to be completely covered with linoleum or carpet a softwood is used for the flooring and left unfinished.

Wood finishes containing an oil base, such as varnish, paint, or enamel, require care to keep them clean and attractive. If the finish is soiled, washing with neutral soapsuds followed by a clear rinse will clean it. Often these finishes merely grow dull because the oil base has become oxidized. Dullness from this cause or from washing may be remedied by rubbing with solutions containing mineral oil, turpentine, or other oils, being careful to remove all excess.

Synthetic floor coverings include linoleums, felt base floor coverings, asphalt tiling, ceramic tiling, and rubber. Attractiveness in design and color, comparative inexpensiveness, and ease of installing have made linoleum one of the most desirable of synthetic floor coverings. It is used extensively in kitchens, bathrooms, nurseries, and other places which need durable, resilient, impervious finishes. Linoleum is an oxidized linseed oil and wood or cork flour mixture calendered to a specified thickness on a backing to give it firmness. The backing has usually been burlap although heavy woven cotton and felt have also been used. The burlap backing is made from either processed or raw material. The processed burlap contains a filler which gives firmness and body to it and it is used with the thinner gauges of linoleum. Raw burlap has been used with the thicker gauges of linoleum because the linoleum is thick enough to give it firmness. With scarcity of burlap, heavy cotton and impregnated felt have been used for any gauge. The manufacturing process involves much time and careful technique including baking and seasoning for from one to eight weeks. Proper seasoning is important; too short a seasoning period leaves the linoleum doughy, and too long a seasoning period leaves it brittle. After the linoleum is removed from the ovens, lacquer is forced into the surface to seal the pores and to make the finish easy to clean. The linoleum is then inspected and imperfections are removed. It is cut into lengths 90 feet long, and into widths of six or 12 feet. It is sold by the square yard or by the lineal foot.

Linoleums are graded according to the thickness of the wear layer or linoleum mix. Heavy battleship gauge is $\frac{3}{16}$ inches, heavy gauge is $\frac{1}{8}$ inch, and standard gauge is $\frac{5}{64}$ inch. Light gauge is anything less than standard. Some manufacturers have used letters for gauge numbers beginning with "A" for the thickest gauge. Linoleum is classified chiefly according to its design. *Plain* linoleum is made from a composition to which a single pigment has been added. It is the same color through to the burlap. *Battleship* linoleum is a thick gauge of plain linoleum. It is used on floors or other surfaces that must stand unusually severe wear.

Printed linoleum was the first variation of the plain linoleum. It was made by printing a design in heavy oil paints on the surface of a plain linoleum after which it was seasoned further. The manufacture and use of this linoleum has been largely discontinued.

Jaspé linoleum appears as irregular stripes in two or more colors. It is made by feeding two colors of linoleum mix directly on to the backing. It is then calendered between hot rolls to give the two-tone wavy-line pattern.

Marbleized linoleum consists of two or more colors of linoleum mix fed directly onto the backing. It is then calendered between cold rolls which produces an everchanging pattern.

Inlaid linoleum is made of sections set next to each other, on the backing chosen. The pattern may be made by combinations of plain, Jaspé, or marbleized sections. The design is the same from the top of the wear section to the backing. For this reason Jaspé and marbleized patterns are often referred to as inlaid linoleums. Technically, however, two kinds of inlaid linoleum are common:

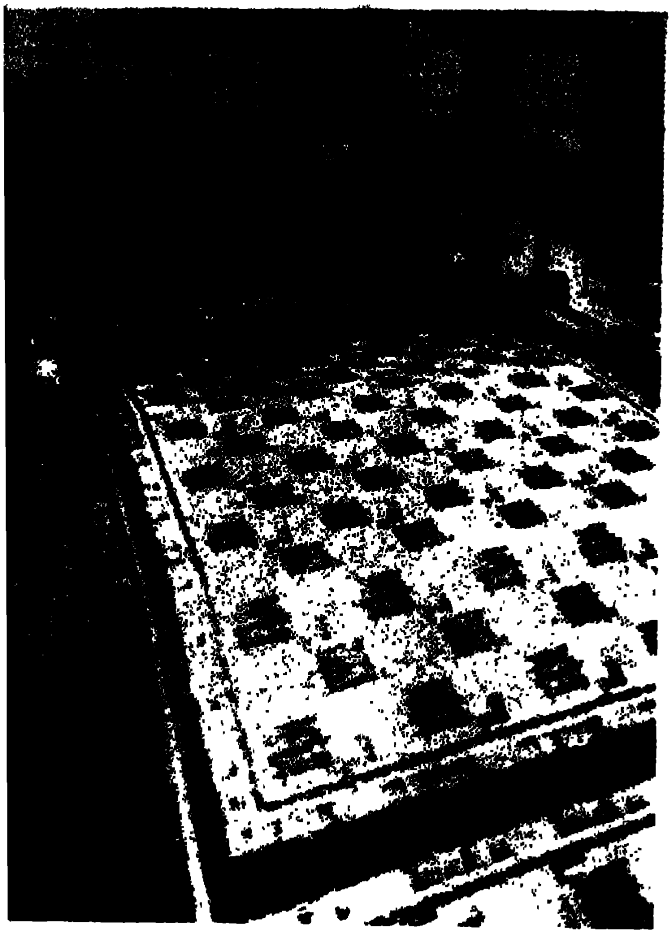
1. *Straight-line inlaid linoleum* is made by rolling out the linoleum mix into sheets which are cut by machine into the desired sizes of the pattern and deposited automatically on the backing. The pieces are rolled and pressed onto the backing. A straight line pattern can be seen from the top and from the side.
2. *Molded inlaid* is made by sifting loose linoleum mix through stencils upon the burlap back. The stencils are arranged ac-

cording to the design to be made, each stencil depositing one color of mix. The stencils must be very accurately made so that the colors deposited on the burlap will neither overlap nor have open spaces between them. After the various colors for the pattern have been placed on the burlap, they are pressed into one solid sheet by a hydraulic press. The sheets are then passed to the ovens for seasoning. Molded inlaid linoleum may be *embossed* by depressing slightly certain portions of the design so that parts of the design stand in relief. Tile and other effects are produced in this way.

Felt base floor coverings are less expensive than linoleums and in some cases have replaced them. They are made from rag felt which has been processed and saturated with asphalt by passing it through tanks of hot molten asphalt until it is completely impregnated. This serves to waterproof, toughen, and give flexibility to the felt. After drying it is coated on both sides, usually with a red paint, which seals the black asphalt saturant in and prevents its sticking to the floor. The felt base is properly sealed when no dark spots show through the coating paint. The design is printed in many colors on the felt base by means of a printing machine. The felt base is then passed into drying racks to remain from four to six days at a temperature of approximately 140° to 150° F. After drying, the material is inspected and classified. The grade is determined by the weight and the thickness. Poor grades of felt base have only one coat on the backing and no prime or face coat to prevent asphalt from soaking into the paint and turning it yellow. Methods similar to those recommended for linoleum are used to lay and care for felt bases.

Asphalt tiling is made of asbestos fiber, color pigments, a binder of asphalt, and in some cases specially prepared minerals. It is claimed not to fade, buckle, curl, or become rough or spotty on the surface, and it is fire-resistant. Unlike other synthetic floor coverings it may be laid on cement floors which are in contact with the ground. Alkali moisture, which destroys other synthetic coverings, does not affect the ingredients of asphalt tiling. The tile comes in two thicknesses, ⅛ inch being standard for ordinary traffic and a heavier weight of $^3/_{16}$ inch for heavier use. The blocks come in plain colors. When installed on concrete, the tile is cemented directly to the floor. On wood floors, an asphalt-saturated felt is cemented to the wood, and the tile is then cemented to the felt.

Ceramic tiling is made of much the same materials as are used in dishes. Its thickness depends somewhat upon the size of the block. It is installed by cementing the tiles to the floor. The tiles are not likely to break unless struck with a heavy object or unless heavy pointed furniture rests on them. Cleaning is accomplished by washing with clear water or soapsuds. The shiny glazed surfaces may in time become rough.



Courtesy Congoleum-Nairn Inc.

A pattern is being printed on felt-base floor coverings. When the design has been completed the material enters drying ovens where the printed surface is baked at high temperatures for several days.

Rubber flooring is made of rubber, mineral pigments which give the necessary density, rigidity, and color to the final products, and chemicals which accelerate vulcanization, provide hardness and other properties. This mixture is tested, rolled into sheets, and then cured in hydraulic presses at about 300° F. The top is polished smoothly and the underside is sanded to the required gauge cut. It may be laid in large sheets or in small pieces like tiling. It is generally more expensive than other synthetic floor coverings. It is easily cleaned with a dry brush or mop. If necessary it may be washed with lukewarm water to which a little ammonia is added. It should be waxed with water-emulsion wax.

Quarry tile is an unglazed vitreous tile formed from natural colored clays. It is stain-proof, almost chip-proof, and good for heavy duty. Its surface is slightly rough but easily cleaned. They are used chiefly for basement rooms or for first-floor concrete slabs resting on the ground. The colors are limited to red and brown.

Some flooring material is poured on a sub-base. *Terrazzo* is a mixture of white cement and marble chips poured on a concrete slab. Metal strips placed at least three feet apart prevent cracks and enhance the design. After it has hardened it is polished by a machine. It is especially suited for basements and for first-floor ground slabs.

Magnesite composition can be troweled to a smooth surface, which is fine-grained but not slippery. It is fireproof and impervious to heat, cold, and dampness. It can be used over worn wood floors after wire mesh has first been applied.

Cement floors are usual in basements and special treatment is required to make them water tight.

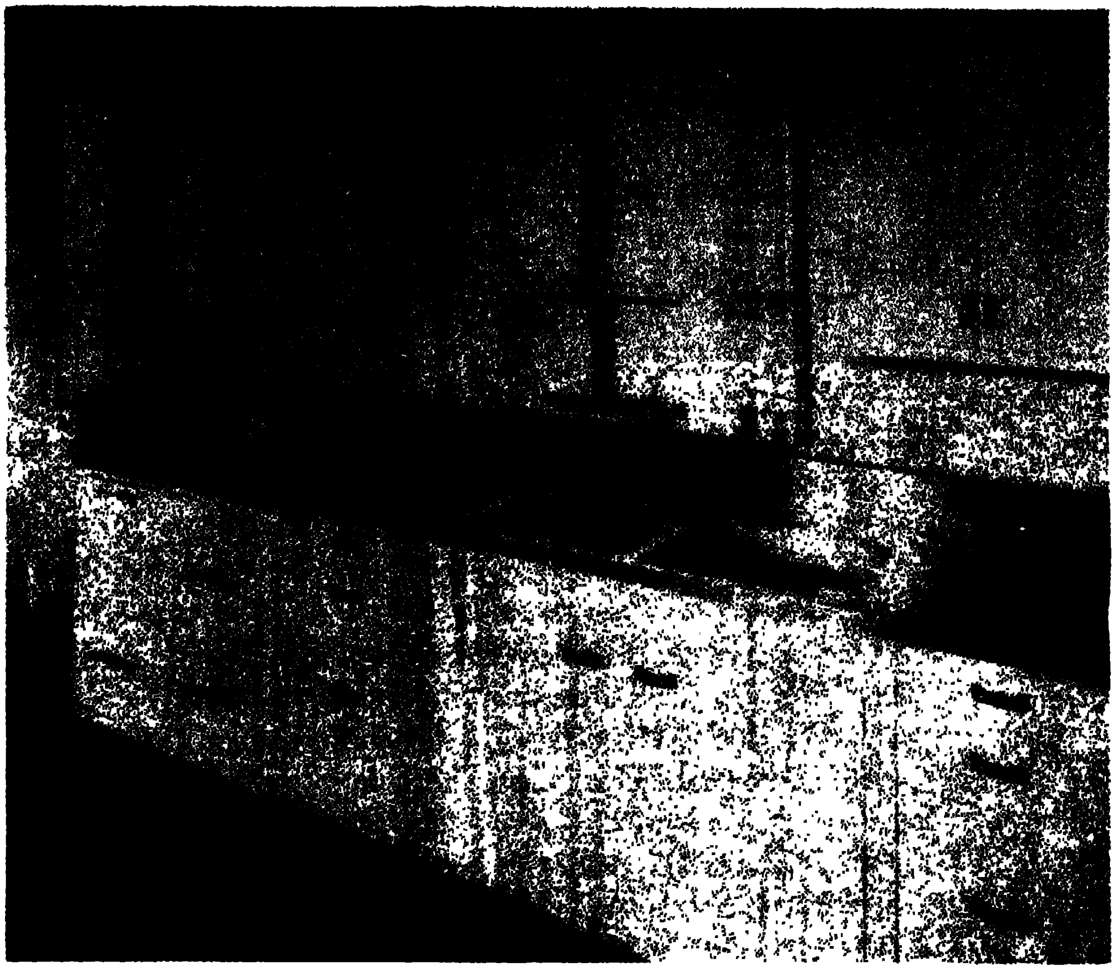
All of these floor finishes and coverings can be cleaned with water and when necessary a mild soap may be used. Care should be taken to prevent water reaching the back side. Use of excessive amounts of water should therefore be avoided. Strong soap and scouring powder, naphtha, kerosene, and gasoline may also damage the covering, so their use is not generally advised. Chair and other furniture legs are apt to mar the surface unless protected by glides or caster cups. Wax will improve the appearance of these coverings and make the floor easier to clean daily. Water-soluble wax can be used on all, and paste or liquid wax can be used on most of these surfaces. Directions from the manufacturer regarding care should be followed. In any case, the wax should be applied in a very thin coat as an excess causes slipperiness and produces a smeary appearance.

The relative uses of each of these materials and finishes for floors are presented in the table on page 446.

The choice of materials and finishes having characteristics desirable for work surfaces and tabletops is another difficult problem. Such surfaces are found in kitchens, laundries, and bathrooms. They should be attractive, easily cleaned, resist-

MERITS OF DIFFERENT MATERIALS AND FINISHES USED FOR FLOORS

Kind	Advantages	Disadvantages
Softwood, painted	Low in cost; as comfortable for standing as any bare floor, attractive.	Finish does not wear well; difficult to refinish the worn spots. Wood is apt to sliver if the finish wears off.
Softwood, oiled or varnished	Slightly more costly than paint; attractive; easily cleaned; durable if good quality material is used.	
Hardwood, varnished	Durable if good quality of varnish is used; smooth; attractive; as comfortable for standing as any bare floor; initial cost and cost of upkeep moderate; a typical floor finish. Easily cared for if water-proof varnish is used. May be waxed.	The varnish must be removed from entire floor for refinishing; noisy, as any bare floor.
Hardwood sealed or waxed	Durable; smooth; attractive; easily cared for in rooms in which water is not used; as comfortable for standing as any bare floor; worn places can be refinished easily; initial cost and cost of upkeep fairly low; a typical floor finish.	The wax must be renewed occasionally; a special machine is required for waxing; is stained by water; is usually a little more slippery than varnish alone.
Printed linoleum and felt base floor coverings	Smooth; easily cleaned; have attractive patterns; initial low cost; more resilient than uncovered wood floor; may be used over old floor.	Not permanent; require frequent refinishing; attractive designs may be difficult to secure.
Linoleum, plain or inlaid	Durable; smooth; easily kept clean; resilient and comfortable; may be used over old floors if they are smooth and dry; reduces noise; attractive	Initial cost comparatively high; linoleum without design shows dust and footprints; patterns may be difficult to keep clean; subject to rot from moisture; dented or cut by heavy or sharp edges.
Tile, asphalt or ceramic	Permanent; upkeep low; good color combinations available; easily cleaned; impervious to moisture and organic materials.	Initial cost relatively high; noisy; not resilient.
Rubber	Permanent; attractive in design; impervious to moisture; quiet; resilient; easily cleaned.	Expensive; may buckle after it is laid.



Courtesy The International Nickel Company, Inc.

This work surface is made in one piece of stainless metal. In this way, seams around the sink, range, and splash back are eliminated.

ant to heat, and to household acid and alkali, moisture-proof, nonabsorbent to fat, and should have a relatively permanent finish. If they do not have a good cutting surface, some other provision must be made for this.

Most of the materials which have been mentioned for floors or floor coverings, with the possible exception of rubber, may also be used for work surfaces or table tops. They may be developed at the factory or formed into the desired sizes and shapes on the job. When linoleum is used the edges should be bound with some material which does not stain clothes as the worker rubs up against it. In addition there are some of the strong, seamless materials such as stainless steel, nickel and chromium alloys, porcelain enamel, glass, plastics, and some of the pressed woods. These materials are formed at the factory into the size and shape desired for the work surface or table top.

Stainless steels are alloys of steel and chromium or of steel, chromium, and nickel. They have high tensile strength and are resistant to corrosion after they have been hardened and polished.

A nickel-copper alloy of high nickel content is called Monel metal. It has a silver-like luster, high tensile strength, and it is resistant to denting, scratching, and corrosion. It is a poor conductor of heat.

Nickel or chromium-plated copper has a hard, highly polished finish which is attractive and durable. Nickel tarnishes slightly but is easily cleaned with a mild abrasive such as whiting. Chromium plating is a bluish white which does not oxidize and needs only to be wiped with a damp cloth.

Porcelain enamel is a glasslike substance fused upon the surface of a metallic base. The metals used are sheet iron, steel, and some types of cast iron. The coating consists of fused mineral ingredients pulverized and mixed with clay and water and set aside to age. The base metal is formed into the desired shape and all impurities are removed. It is dipped into the liquid enamel and dried and baked in a furnace where the glass melts and fuses into the pores of the base metal. One, two, or three coats of enamel may be given the article. Porcelain has practically all the properties of glass and it will not scratch, peel, or corrode. It can also be made in many different colors.

Plastics are materials made from compounds of various substances. The first was celluloid made from cotton cellulose treated with nitric acid. The second was a casein material made by mixing formaldehyde with sour cow's milk. A third was made when phenal and formaldehyde were brought together under the right conditions of temperature and pressure in the presence of a catalyst. This was called Bakelite. Many other compounds have been made and go under the names of Beetleware, Catalin, Durite, Lumarith, Lucite. Tenite, and others. From the functional standpoint, the plastics can be explained by the form in which they are used: among others, there are the laminates, the molded products, and the cast products. Plastic laminates are the most common of the plastic finishes found in the home. They are made in flat thin sheets for use as a decorative, protective veneer mounted on fiber board, plywood, or other material. These are used as finishes for counters, bathroom and kitchen walls, and table tops. When mounted on thin parchment paper, place doilies and table cloths are the result. The laminates afford a hard, smooth surface which is resistant to water and acids, and may be impervious to burning if the material underneath is impervious.

The relative merits of the materials used for working surfaces and table tops are presented in the table on page 450.

Several different finishes are available for the walls of the house. If possible a finish for the wall should be attractive, easily cleaned, and such that it does not produce glare. Several finishes are possible including oil paints, both glossy and flat, water paints, glass and wallpaper. In addition, thin linoleums have been developed for walls requiring a waterproof covering.

Paints and enamel for interiors consist chiefly of pigment mixed in varnish or drying oil. Paint is known as flat, semigloss, or gloss according to the way in which light is reflected from its surface. A typical paint contains a relatively large amount of pigment mixed in a drying oil. It can be applied in a rather thick coating. A typical enamel, on the other hand, contains a relatively small amount of pigment mixed in varnish. It can be applied only in a fairly thin coating.

For large areas such as walls and ceilings flat paint is most attractive because it diffuses light. Contrary to popular belief, flat paint is soiled less rapidly than gloss paint; however, once soiled, it is harder to wash evenly and will not stand as much washing as gloss paint. Semigloss paint is less harsh in appearance than gloss paint and stands more washing than flat paint. Wood trim, doors, and cabinets can be pleasingly accentuated with paint or enamel of higher gloss than that used on the walls.

Water paints are of two kinds: calcimine and casein. Calcimine is usually a claylike substance suspended in water. It is even flatter and softer in appearance than the flat oil paints. Although it is easily damaged by water and cannot be cleaned,

RELATIVE MERITS OF DIFFERENT MATERIALS USED FOR WORKING SURFACES

Materials	Advantages	Disadvantages
Wood: maple, pine, birch	Comparatively cheap; noiseless; attractive; easily cleaned if properly finished; durable; good cutting surface if left unfinished. Maple absorbs grease the least.	May warp with heat and dampness; needs frequent refinishing; finish may not be heatproof.
Pressed wood	Comparatively cheap; noiseless; does not crack or warp with heat; easily maintained. Good cutting surface.	Choice of colors limited. Edges must be bound with metal or plastics. Must be glued to substantial base. Damaged by abrasives when cleaning.
Linoleum	Reasonable in price; attractive color; durable if properly applied; easily cleaned; quiet; resilient; reduces breakage of dishes.	May buckle; is not entirely heat resistant. Good installation required for sanitary reasons. Edges must be bound with metal or plastics; not a good cutting surface.
Porcelain enamel	Attractive; easily cleaned; heat resistant; moistureproof; non-absorbent to fat.	May crack if hit by a hard blow or if food chopper is screwed to tabletop; noisy; lacks resiliency; expensive; produces glare, subject to discoloration unless acid resistant; not a good cutting surface.
Metal alloys	Attractive; durable; easily cleaned; heat resistant; not affected by acids and alkalies; moistureproof; non-absorbent to fat.	Expensive; spot if water dries on them; show fingerprints and scratches. May be noisy. Not a good cutting surface.
Plastics	Can be heat, water, and acid resistant. Wide color range. Noiseless, easily cleaned.	High cost. Will scratch. Requires care in installation.
Tiles	Attractive; durable; easily cleaned if joinings are properly done; heat resistant.	Comparatively expensive; noisy; lack resiliency.
Glass	Smart in appearance. Easily maintained.	Costly. Noisy. May produce dish breakage. May crack with heat.

it can be washed off entirely when it becomes soiled and a fresh coat applied.

More expensive than calcimine but cheaper than oil paints are casein paints. Flat and soft like calcimine, they are of two types, the powder paints and the paste paints. The powder paint is mixed with water just before use. The paste type comes already mixed with part of the water, and the remainder of the water is added later. After casein paint has been dried for about a month it can be washed gently and quickly with mild soap and water.

Glass has long been used for bringing light into houses. It comes in a number of grades. Structural glass has been introduced for wall finishes especially in bathroom and kitchen, but it is used also in other rooms. It is smooth, stain- and scratch-proof, and is made in a variety of colors.

Wallpapers may be had in many attractive designs and patterns and for almost any price desired beginning with a few cents a roll and going up to several dollars a roll. The lowest grade known in trade as *skins* is sold for a few cents a roll. The pattern is printed in low grade ink which may fade. The paper itself is untreated and so may be subject to burning or discoloration from light. In the next qualities of paper the pattern may be fade-proof but the paper may discolor, thus producing an odd effect. Some of the patterns are interesting and if carefully protected from light they retain their appearance for some time. The next grade is fade-proof and washable. The paper is subjected to a chemical treatment putting an opaque layer on the paper which is impervious to light rays. Paper so treated is said to be grounded. The pattern on grounded paper is usually fade-proof so no discoloration due to light will occur on this paper. Grounded wallpaper may be waterproof also and if so is designated on the back as washable wallpaper. Varnished or waxed papers which can be washed have been developed for use in kitchens or bathrooms. These are relatively high in price and are usually clearly labeled. At regular intervals on the back of a roll of wallpaper reliable manufacturers make a statement in regard to the following matters: *Color fast* means that the colors printed on the paper will not fade. *Water-resistant* or *washable* means that colors will not streak or run when water is applied. The background of these papers is also resistant to the burning action of light.

When washable wallpaper is chosen, fingermarks or other accidental soil can be removed with ease, rain or water splashed on the wall will not make the colors run or streak. and areas can be washed with mild soadsuds and water. Wallpaper cleaner of a doughy consistency is generally recommended for use with any type of wallpaper.

American-made papers are usually sold in either an 18 inch width or a 30 inch width. The standard length of a single roll of the 18-inch paper is eight yards with a coverage of 36 square feet. The standard length of a single roll of the 30-inch paper is five yards with a coverage of 37.50 square feet. The term "single roll" is used only for the purpose of pricing wallpaper which is always on the basis of a single roll. All 18-inch wallpaper comes packed in double rolls of 16 yards and can be sold only in that size. All 30 inch wallpaper comes packed only in triple rolls of 15 yards and can be sold only in that size. Estimates of the amount of wallpaper to cover a room are made on the basis of single rolls. Tables similar to the one on page 453 have been developed for this purpose.

Scenic wallpapers come in large panels and some imported papers come in small panels.

The decorations on wallpaper are applied in several different ways. With the simplest method plain paper which consists of a single tone of color is used. This may be on grounded or ungrounded paper. The design may be printed on the paper which may or may not be grounded. When the design is engraved, it is delicately raised on the surface of the paper stock and appears only on high class and dignified appearing papers. Because of its quality it is always on grounded papers. Some papers have their pattern enhanced or emphasized by an embossing process. The paper is run over heavy embossing rollers which cause the paper to assume a rough and heavy appearance that may be pleasing. Other decorations may be gilded, beaded, or flocked.

NUMBER OF ROLLS OF WALLPAPER REQUIRED FOR ROOMS[1]

Size of Room	Single Rolls of Side Wall			Yards of Border	Rolls of Ceiling
	Height of Ceiling				
	8 feet	*9 feet*	*10 feet*		
4 x 8	6	7	8	9	2
6 x 10	8	9	10	12	2
8 x 12	10	11	13	15	4
8 x 14	11	12	14	16	4
10 x 14	12	14	15	18	5
10 x 16	13	15	16	19	6
12 x 16	14	16	17	20	7
12 x 18	15	17	19	22	8
14 x 18	16	18	20	23	8
14 x 22	18	20	22	26	10
15 x 20	17	20	22	25	10
20 x 26	23	28	28	33	17

Note: Deduct one single roll of side wall for every two ordinary sized doors or windows or every 36 square feet of opening.

Suggested Activities

1. Identify softwoods and record the following information about each: name of wood, distinguishing characteristics, uses ordinarily made of it, methods of finishing.
2. Identify hardwoods and record the following information about each: name of wood, distinguishing characteristics, uses ordinarily made of it, methods of finishing.
3. Select woods illustrating the methods of sawing. Sketch the pattern made by the grain on the top of the wood and on the end, of quarter-sawed and plain-sawed. Which of these methods should be used for the door of a fine cabinet; for the kitchen floor?
4. Which of the woods studied is the most costly?
5. What care should be given painted surfaces?
6. What care should be given varnished surfaces?
7. Identify synthetic floor coverings. About each sample indicate the following information: manufacturer, distinguishing characteristics, materials from which made, wearing quality or gauge.

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[1] *Price Guide,* Fifth Edition. Painting and Decorating Contractors of America, Brown Building, Philadelphia, Pa., 1943.

8. List synthetic floor coverings in ascending order of cost.
9. What care is recommended for linoleums?
10. What care is recommended for felt base floor coverings?
11. A room is 12′ 0″ x 15′ 0″ with an 8′ 6″ ceiling. There are three openings. Select paper of three different kinds, a printed and ungrounded paper, an engraved paper, and an embossed paper. Figure the cost of the paper for the room, using each of these papers. Include ceilings and borders if you desire to use them.
12. What woods, wall, floor, work surface finishes are used in your home?

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Problem 2. WHAT CONSTITUTES ADEQUATE PLUMBING EQUIPMENT?

In the earlier discussion of the relation of housing to health, it was stated that the presence or lack of certain facilities in a house affected in a demonstrable manner the health of the family living in it. These facilities were: running water in the house and a flush toilet for the use of the individual family. There is a tendency to accept these facilities as minimum essentials to living, yet, as a matter of fact, they are not available in many urban and rural homes in America. Modern plumbing that will bring an adequate supply of safe and palatable water into the home, and provide for sanitary disposal of the wastes of the home is still as far from a commonplace here as in other countries.

What is included under plumbing? The term as commonly used includes the pipings and attachments which convey water into the house and provide for its discharge at various points therein, the fixtures which enable the use of the water at desired points, and the pipes which collect and convey sewage from the house to its final disposal.

The water supply may be procured from a publicly maintained source, as from a city, or from an individually developed source, as from a well and its pumping equipment on a farm. The installation of a plumbing system must follow local Board of Health regulations, which in most communities stringently control all danger spots. All communities have health departments willing to advise and co-operate in maintaining maximum safety.

If the water supply is publicly maintained it may be obtained from springs or wells, but often an adequate supply can be assured only if it comes from rivers or lakes. The problem then is to make an adequate water supply *safe*. This can be done only by purification processes which will not only rid the water of objectionable color, taste, and odor due to the growth of algae and related forms of life, but will also render the water free from disease producing microörganisms. The prevalence of typhoid epidemics in earlier generations is testimony of failures to provide safe water for human needs. Today, such epidemics are rare, indeed. Our freedom from them is largely due to the constant efficient testing of urban water supply for signs of pollution, and the prompt use of chlorine or other means of purification if pollution is detected.

If the water supply is stored in a reservoir high above the city, gravity furnishes enough pressure to bring the water through the pipes to the place of use. As a rule, however, a pumping station is necessary to produce the 20 to 40 pounds of pressure per square inch which is needed for domestic service. Sometimes when the up-grade is great, the pumps force the water directly into large pipes called mains; but usually standpipes, which tend to equalize the pressure, are erected at various elevated places. From the standpipe or reservoir the water is conducted through the mains to the various parts of the city. These divide and subdivide to allow a main to run down each street. The water pipe, or the supply pipe, is then run from the main to the building to be served. The pipes are laid in the earth below the lowest frostline for that climate. This cost of the installation of the supply pipe is chargeable to the householder served.

The possibility of a plentiful supply of water from a well or spring has ever been one of the important considerations in locating the farmstead site. Whatever the source, the individual householder should make sure that the water is not contaminated from cesspools, barnyard drainage, or other sources of pollution. The responsibility of transporting the water into the house lies with the individual householder. He has the choice of several devices for delivering water from its source to the scene of its use. He may carry the water into the house, in which case pails and a strong arm and back are required. Provision of running water in the house, however, is one of the first improvements desired by the rural dweller. A choice of several ways of forcing water into the house is open. The house may be located near a hill on the top of which is a small reservoir or cistern filled from a near-by well. From this cistern the water is piped into the house and gravity furnishes the pressure to force it through the faucets. It is not always possible to find the conditions for such an arrangement, however, and various methods must be employed to furnish the pressure necessary for running water in the house. An elevated tank located either in the house or out-of-doors distributes water by gravity. The water may be pumped into this tank by hand, by a windmill, by a gasoline engine, or by an electric motor. In some cases it is necessary to supply pressure by means other than gravity to bring water into the house. Air compressors may be installed which force air into the water storage tank and thus give sufficient pressure to supply water to any part of the house.

Regardless of the source of the water supply, whether from the city mains or from a privately owned storage tank, the supply pipe into the house should be equipped to shut off the flow of water at, or near, the point of entrance. A stop-cock for shutting off the water and a drain-cock for draining the pipes are convenient when repairs to the plumbing are necessary, or when there is danger of the pipes freezing. A stop-cock on the supply pipe under each of the fixtures also makes it possible to repair faucets without shutting off water from the whole house.

The supply pipe into the house branches in order that parts of the house may be supplied with water. If the house plan permits, a saving in plumbing installation can be effected by grouping together those rooms which will use plumbing fixtures, as for example, placing the bathroom over the kitchen, the arrangement in each being such as to place the fixtures on the same wall; or in a one-story house, the bathroom may be placed on a common wall with the kitchen. By all means, the plumbing should be placed in the house as it is being built and in general placing the pipes in outside walls is to be avoided in cold climates. Plumbing installed in completed houses necessitates stripping plaster and lath from the wall to receive the pipes, or the unsightly alternative of installing pipes exposed outside the wall.

The kind of material selected for the water supply lines which connect the street main to the house fixtures depends upon the hardness of the water. Hard water which has a high amount of mineral, especially of calcium and magnesium, tends to build up an inner coating of scale which may in time be sufficient to clog the pipe, especially in the hot water section of the system. In addition to its effect on the pipes, hard water adds greatly to the difficulties of laundering and dishwashing and robs the bath of its joy. Soap, when added to it, forms an insoluble, greasy sort of curd. Sometimes citizens demand that the water supplied to the city or town be made not only safe, but soft enough for effective use in household activities. Various softeners are used, but the zeolite water-softening process is both common and effective and it can be used in the private system. This type of water softener is an insoluble sodium silicate having power to exchange its sodium for an equivalent amount of calcium and magnesium. It requires periodic recharging with salt. Natural soft water, which is free of large amounts of minerals, is apt to have atmospheric gases dissolved in it which makes it corrosive. The pipes used for the water supply lines may be ferrous or nonferrous pipings. Galvanized wrought iron, galvanized steel, and cast iron with a corrosion-resisting lining are the most commonly used ferrous piping. Nonferrous pipings are either copper or brass and must be used where water is highly corrosive. They are smoother than the ferrous piping and so are usable for hard water as they discourage the deposit of scale. Lead pipes are not much used at present, as they are expensive, are affected by soft water, and may cause lead poisoning.

Both supply and drain pipes must be large enough to provide for inlet and outlet which is neither too swift nor too sluggish. Noise of flowing water in pipes is caused by pipes that are too small. Supply pipes range in size from one-inch to one-half inch in diameter. Drain pipes range from two to four inches in diameter.

The control of the flow of water is determined by the use of valves known as cocks, faucets, and wastes. Valves are commonly made of brass, sometimes coated with nickel or chromium. The methods of closing the valves are illustrated by

Courtesy Bureau of Standards, U. S. D. C

Types of faucets. *Left*, a compression faucet. *Upper right*, a Fuller faucet. *Lower right*, a ground key faucet.

the different types of faucets, as the compression, the ground key, and the Fuller.

In the **compression** type faucet, the flow of water is regulated by turning a handle which is attached to a threaded spindle. When the faucet is closed, the spindle has been turned till the washer or disk attached on the lower end is pressed tightly against a seat which surrounds the flow opening. This disk or washer requires replacement occasionally. There are various styles of compression faucets but their construction is fundamentally the same. The *quick-compression* faucet opens or closes with but few turns because the spindle is threaded at a considerable slant. The *self-closing* faucet has a spring fastened around the spindle in such a way as to automatically close the faucet when pressure is released. The *mixing* faucet consists of a spindle on both the hot and cold water supply lines with a common spout. The *sill cock* is the term applied to a faucet having a threaded spout placed near the sill of the house for the purpose of supplying water for a garden hose. The main *shut off* valve and other shutoff valves are usually of the compression type. These, of course, have no spout, but the main shutoff valve may have an opening to drain out water standing in the pipe above it.

A thumping noise in a water pipe when a compression faucet or valve is partly open may be due to a loose cap nut, a worn spindle, or a loose or defective packing washer or disk washer. An examination of each of these parts should reveal the trouble. It may be that the spindle and washers must be replaced.

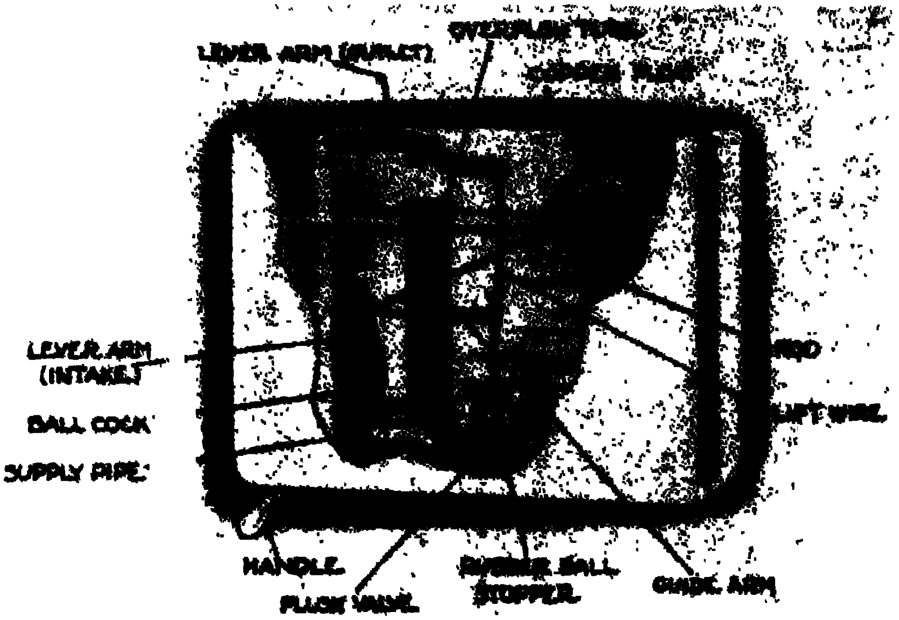
The **ground-key** type of faucet has a tapered cylindrical brass plug fitting snugly into a sleeve bored vertically through the body of the faucet. The plug, rotated by a handle, has a slot bored horizontally through it to coincide with a similar opening in the body of the sleeve. The faucet is open when the two openings are in line with each other. This type of valve is used for the "shutoff" at the curb and for controlling gas supply.

The **Fuller** faucet has a hard rubber ball-like stopper which is fastened to a shaft having an eccentric end. Turning the faucet handle a quarter of a turn draws or withdraws the ball firmly against the flow opening, thus closing or opening the faucet. This type of faucet is not as much used as formerly.

Three types of valves are used for the discharge of water into and out of the water closet or toilet. The **flush-ball** valve is raised in the closet tank by a trip lever. The air in the ball keeps it in the open position until the tank is emptied; then the ball valve drops into the valve seat, stopping the flow of water from the tank.

The **float** valve is used to control the flow of water into the flush tank. The quantity of water in the tank when filled is determined by the height of the float when the valve is closed. When the water is emptied from the tank by the action of the trip lever on the ball valve, the float drops, opening the float valve which lets water into the tank. A refill tube is provided which allows a small amount of water to go into the toilet bowl through the overflow pipe. This assures the filling of the trap in the bowl to the maximum height. When the float reaches its original position, the valve closes, and the tank is ready for flushing.

Automatic flush valves takes the water directly from the water supply to flush the closet bowl. When these valves are used the flush tank and connection are unnecessary. The



Courtesy Bureau of Standards, U. S. D. C.

Cross section of a water closet tank showing its parts.

valve is opened by a lever which empties the water directly into the closet. The closing of the valve is automatic, usually controlled through a by-pass, and regulated by a screw determining the time the valve is kept open. This is a noisy type of flush.

Waste valves are manufactured in many designs for the discharge of the water used in a fixture. The most common form is the **chain-and-plug** which consists of a rubber plug on a chain which fits into an opening. This type of fitting is the most reliable, the tightest fitting, and most sanitary.

Mechanical waste valves are used in bathtubs and lavatories. These valves are operated without putting the hands in the water to be drained. Adjustment may be necessary if the valve does not seal itself properly. These waste valves include:

The **pop-up waste** valve consists of a metal ground-joint plug, operated by means of a lifting knob. This is neat and sanitary, especially for use in the lavatory.

The **standing waste** valve consists of a barrel with a ground seat which, when lowered all the way into the waste chamber, makes a tight joint and holds the water in the tub. Dirty water

Courtesy Crane Company

Workman preparing the surface of a sink for porcelain enamel. A texture is developed on the rough casting to form a bond between it and the finishing coats of enamel.

constantly surrounds this barrel, which makes this type of waste fitting unsanitary.

The **fixtures** are the receptacles intended to receive, hold, and discharge water, liquid, or water-carried wastes into a drainage system with which they are connected. Fixtures include kitchen sinks, lavatories, bathtubs, shower stalls, water closets, and laundry trays. Fixtures are made from porcelain enamel, vitrified china, monel metal or stainless steel, and marble.

Porcelain enamelware plumbing fixtures are made in the same way as any other kind of enamelware; that is, a glass-like substance is fused on cast iron. Recent improvements of the enamelware make it resistant to household stains and acids. Fixtures made of porcelain enamelware are somewhat less costly than fixtures made of other materials. Sinks, lavatories, and bathtubs are frequently made from this material. Although ordinary porcelain enameled iron is largely used for sinks and is quite durable, an acid-resisting porcelain enamel is advised even at an increase in cost of 25 per cent. If desired, fixtures in this material may be obtained in a wide variety of colors; however, colored china or porcelain fixtures cost approximately 50 per cent more than the white ones, and colored porcelain enamels cost 25 per cent more than white.

Monel metal and stainless steel are used for sinks and lavatories. They are impervious to stains and scratches, but are somewhat more expensive than other materials. They must be polished to remove water stains.

China is used for pieces not over 36 inches in length, as longer ones than this tend to warp out of shape in the process of drying and firing. China is all clay, white throughout, and impervious to ordinary household acids and cleansers. These characteristics make it highly desirable for the closet bowl.

Marble is used only for flat surfaces because it cannot be molded. Any curved or shaped parts that are needed to go with the flat marble surfaces must be made of porcelain enamel or vitreous china and fitted to them. Marble may be used for the flat surfaces and back splashes around lavatories.

Fixtures of all kinds come in many different sizes, most of which are as yet unstandardized. It has been said that if sizes and styles were standardized to a few models, the price for each one could be materially reduced. When choosing fixtures, careful thought should be given to all the characteristics of each fixture considered so that the one best suited to the situation may be selected.

In as much as the kitchen sink is often the first fixture installed in a rural dwelling, it may be regarded as one of the most important fixtures. Kitchen sinks may be had in several different sizes and styles. The sink bowl itself may be 15 inches wide by 30 to 32 inches long or around 15 inches square. When the bowl is 15 inches square, two bowls may be ranged side by side, one of them being used for washing dishes and the other for rinsing. The sink may be free standing, in which case a drainboard on one or both sides and a splashback may be an integral part of it. In addition, the rough underpart of the sink is hidden by an apron, also an integral part of the

Courtesy Kitchen Maid Corp.

Modern kitchen sinks offer much in the way of conveniences.

sink. The steel cabinet sink wherein the sink is mounted over a steel cabinet designed to hold some of the utensils needed at the sink is a variant of this style. The sink may be built into the cabinet work of the kitchen. In this case it may be any size, single, or double, and the rim is flat to enable close joining of it with the work surface. It may or may not have drainboards, but a short splashback integral with the sink is desirable for the installation of the faucets. If it is desired to have all the working surfaces on adjoining cabinets made of the same material as the sink, they may be a continuous integral part of the sink. This arrangement is usually made 'to order' of porcelain enamel, monel metal, or stainless steel. The height of the bottom of the sink is important, 32 inches being acceptable to many. Numerous conveniences for straining are available, varying from a single strainer or a double, basket-like strainer to a garbage disposer which grinds to small pieces everything put into it, then flushes it into the waste pipes. A mixing faucet which swings is desirable.

The lavatory is used often and should be designed to enable bathing face and hands, as well as sponge bathing of the whole body and shampooing the hair. The bowl should be deep enough to hold a generous supply of water without splashing, and designed to receive water from the faucets without splashing. The slab around the bowl should be wide enough to hold soap, rinses, and other items to be used in connection with the bathing activities done there, and a splashback is usually an advantage. The lavatory may be hung on the wall by means of a cast-iron hanger fastened securely to the studding, or it may be supported by a pedestal. In some cases slender legs are an additional support for the wall-hung lavatory. The height of the lavatory is also important. A check should be made to determine if the customary 30 inches for the top of the bowl is the best height for the family using it. Research seems to indicate that 30 inches should more nearly be the bottom of the lavatory. If shampooing the hair is an activity done at the lavatory, a mixing faucet is an advantage.

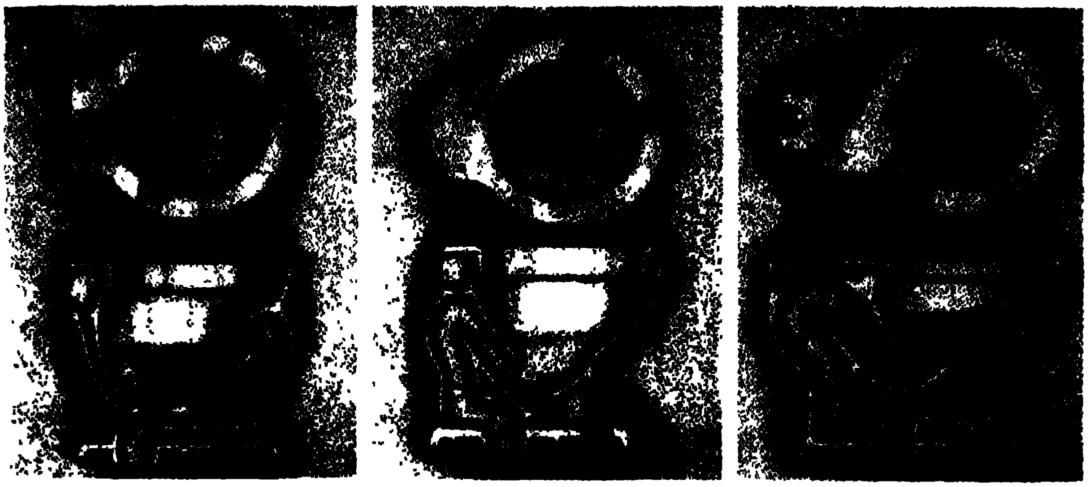
Bathtubs may be found in almost any style desired. They may be straight on all four sides to provide maximum area on the bottom, they may slope on one end to permit the bather to recline, or they may be arranged to form a diagonal tub in a porcelain enamel square leaving a slab on which the bather may sit. The length of the bathtub should be sufficient to accommodate the person using it. The lengths range from four feet to six feet, but five feet six inches is the most common length.

Bathtubs are made in three forms: the roll-rim type on legs, the roll-rim type on a pedestal, and the built-in type. Built-in tubs may be recessed to join the wall on three sides, or they may fit into a left-hand corner, a right-hand corner, or they may join the wall on one side only. The built-in type is usually the most satisfactory provided the joining with the wall is secure. In large bathrooms the bathtub may be free standing.

Shower stalls for use in the bathroom are made by installing a shower receptor with walls above it of tile, marble, or glass, or with curtains. A waterproof door with space above for ventilation completes the compartment. Shower bath heads are of various designs and the direction of the spray as well as the temperature of the water can be adjusted. In some cases a shower bath head is installed over a bathtub.

Water closets are used as receptacles for human waste and as such should be planned to aid in the function of excretion. The abdominal and intestinal muscles act most effectively when a person is seated at a height of between 14 and 15 inches. Closet bowls should therefore seat a person at that height. It should be possible to maintain the water closet in a sanitary condition. The interior surface may become fouled if the construction does not permit it to be covered with water, and it absorbs odors if the closet is made of a material which checks and crazes. For these reasons, and because closets are more frequently cleaned with strong cleaning agents than are other bathroom fixtures, it is essential that they be made of vitreous china which is fired twice and is, therefore, impervious to the action of acids and alkalies. This material is usually smooth and consequently somewhat self-cleansing. There should be a vigorous flush which combines a strong scouring action and expelling force. Water for flushing may be provided from a flush valve or from a six- to eight-gallon tank. In order to have fewer exposed parts around the water closet, the modern fixture is often made in one piece with the tank. This design improves the appearance of the fixtures and usually provides quieter action than the higher tank or automatic flush valve. Water closets are classified according to the way in which the flush action is applied in the bowl. The various types are described as follows:

The **siphon jet** is considered the most desirable. Water enters the flushing rim at the back, around the rim, and through small jets, to wash the sides of the bowl. At the same time one or two jets from the bottom set up a siphon action in the bowl which draws the contents of the bowl out and into the waste line. This type of bowl has a deep water seal against the en-



Courtesy Washington-Eljer Co.

Common types of water closets. *Left*, the washdown siphon action. *Center*, the reverse trap with jet. *Right*, siphon jet. The amount of water surface is shown above, in each instance.

trance of sewer gas. There is a large water area and a minimum of fouling surface.

In the ordinary siphon-action or **wash-down** type the flushing around the rim raises the level in the closet bowl sufficiently to force the water over the top of the dam and to start the siphon action into the waste line. This bowl has a greater fouling surface than the siphon jet and is noisier.

The **blow-out bowl** depends upon a sudden discharge of water under high pressure for its action. It can be used only with a flush valve; it is positive in its action, but noisy. It is for the most part found only in public toilet rooms.

Laundry trays may be installed in the area where laundry is done. They may be made of porcelain enamel, soap stone, or a special waterproof cement. Their height is important if they are to be used for washing clothes. When they are used for rinsing tubs with a washing machine they must be low enough for the wringer or the extractor to slip over the top edge.

When automatic washers are used, connection with the hot and cold water supply pipes and the drain is usually a prerequisite. For other washers facilities for filling and draining are important plumbing equipment.

The design and the material of plumbing fixtures, the brassware which connects them to the water system, and the waste fittings should contribute to the ease of producing sanitation in the home. The table on this page summarizes various features which should be sought and features which should be avoided.

DESIRABLE AND UNDESIRABLE FEATURES OF PLUMBING FIXTURES

Fixture	Desirable	Undesirable
Sink	Acid-resisting porcelain enamel Monel metal, or stainless steel Chromium finish on fittings Large enough to enable the desired dishwashing practices Bottom of sink 31 to 32 inches from the floor	Ordinary porcelain enamel Porcelain China Thin nickel finish on fittings Too small for desired dishwashing practices Too high or too low
Lavatory.	Rim high enough to give comfort when using Mixing faucet Chain and plug fittings or pop-up waste Roomy basin, wide platform	Separate spouts Standing waste Faucet integral with the lavatory Shallow, small platforms
Bathtub..	Porcelain enamel Chain and plug waste fittings Flat bottom Sloping back if bather wishes to recline Built-in Of a size suitable to the persons using it	Standing or pop-up waste Rounded bottom Straight back if bather wishes to recline Free standing Too large or too small
Water closet..	Large water area (minimum fouling surface) Large water way Vitreous china Quiet flush Good fitting seat	Small water area (large fouling surface) Small waterway Porcelain or porcelain enamel Noisy Rounded seat

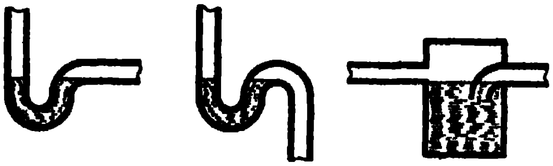
Although the hot water heater for the home cannot be regarded as a fixture it is an important part of the water system and its presence and use contribute greatly to the comfort of the home. The water may be heated by one of several methods. The coils may be in the firebed of the furnace or kitchen range, in the boiler of the furnace, or there may be separate water heaters using coal, oil, gas, or electricity as the fuel. The supply may be an instantaneous system wherein a large coil heats water as it is drawn, or there may be a storage tank for the hot water.

The separate water heater with tank is one of the common methods of heating. The heat may be regulated manually, whereby the heat is turned on and the water heated as needed, or it may be automatically regulated maintaining a tankful of water of a desired temperature at all times. Regulation is by relief valves placed on the water storage tank to prevent excessive pressure, or by thermostats and mixing valves to prevent excessive temperature. A temperature of 130° Fahrenheit for average household use is considered adequate, although higher or lower temperature may be required for special purposes. The size of the water storage tank should be large enough to insure an adequate supply at all times. Fifty gallons of hot water a day is the family's average need, but a 50-gallon tank is not necessary to supply this because of the rapidity with which a tankful of water reheats. The usual sizes are 20, 30, and 40 gallon tanks. In a small house 10 gallons per person, in a medium-size house 15 gallons per person, and in a large house 25 gallons per person are the usual requirements.

The sewerage system of the house consists of the pipes which carry out the sewage, consisting of grease-loaded water from the kitchen sink, soapy soiled water from the lavatory and bathtub, and human excreta from the water closet; and the traps and vents which prevent sewage gas from entering the house.

The house drain is a large pipe located in the lowest point in the house. It connects with the outside sewer and also to the soil pipe which extends vertically from this point up through the roof. From this, branch pipes, called waste pipes, all sloping downward are connected with the fixtures. Soil from any fixture thus is carried out of the house by gravity.

Sewer gas, formed by the decomposition of substances in the sewer, may rise through the pipes and contaminate the air unless checked by fixture traps. The ordinary fixture trap is a tube of the same diameter as the waste pipe bent in a



A few types of traps used in plumbing. *Left*, a P-shaped trap; *center*, an S-shaped trap; *right*, a drum trap.

P or S shape. This bent tube remains filled with waste water, and thereby excludes from the house the foul air of the sewer. The P-shaped trap has its discharge outlet into the wall back of the fixture; the S-shaped trap has its discharge into the floor. Drum-shaped traps whose action is similar to the P- or S-shaped traps are used in the floor under bathtubs. It is necessary to provide vent pipes in the drainage system to which each trap has a connection. These usually join into a common pipe extending above the roof to the open air. The purpose of the vent pipes is to maintain a balance of air pressure within the drain pipes and thus to prevent back siphonage through the traps.

As in the case with the water system, the sewerage system may be publicly maintained or it may be individually maintained. Public maintenance requires simply that the house drain be connected with the sewer main in the street, and sewage is carried off with no further attention from the householder. Individual maintenance requires some special arrangement. A cesspool is a common device, but the septic tank is usually considered more sanitary. The septic tank, made of concrete, settles and liquefies solids, and the resulting fluid then leaches out or is piped out to be absorbed by the ground. The septic tank should have a capacity equivalent to one day's sewage, or approximately 60 gallons per person.

Although in general the services of a licensed plumber should be used for installations and major repairs, some minor repairs by a member in the home are possible. The location of all shutoff valves should be known by all members of the family. Such knowledge may prevent damage from flooding in case of an emergency. The main shutoff valve should be closed and all water drained from the supply pipes and traps of the house if the house is to be closed during freezing weather. The traps should be filled with kerosene or an antifreeze to prevent sewer gas from entering the house. It is an advantage to know how to take off the handle, the screw cap, and the spindle of a compression faucet and replace the packing, or the seat washer when the faucet drips or causes a noise. When the waste pipes clog, it is desirable to know that minor obstructions can be removed with a plunger, a plumber's eel, or how a trap may be cleaned in position. Occasional flushing of pipes with strong alkalis may keep them clean, but grease should be kept out of the pipes as it may harden when cold. An alkali added to it forms a soaplike deposit that is difficult to remove unless mechanical means are used. Fixtures should be polished with mild abrasives, soapsuds, or kerosene. Some stains can be removed with household bleaching compound.

Suggested Activities

1. What state or local health regulations govern the supply of pure water in your town?
2. Describe a successful system of running water and sewerage in a rural home. Sketch its important parts.
3. What is the plan of the plumbing in the house in which you now live? Trace the water pipes from the place they enter the house to each of the faucets in the house. Trace the sewerage from the fixtures to the place it leaves the house. What is the purpose of the vent in the sewerage system? Where is it in your house? What is the purpose of traps in the sewerage system? Name each kind in your house and state its use.
4. If you were leaving a house for a winter vacation what care should be given the plumbing? Would the same care be given during a summer vacation?
5. Identify various types of faucets. Diagram the parts. Indicate the most frequent uses.
6. What are the indications of need of repair on compression faucets?
7. Put a new washer on a compression faucet. Outline the steps one by one.
8. What are the most suitable characteristics in available sinks,

lavatories, water closets, bathtubs, laundry trays, shower base, and hot water heaters?
9. How are plumbing fixtures and fittings cared for?
10. What simple plumbing repairs can be made by the layman?

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Problem 3. WHAT EQUIPMENT FOR AIR CONDITIONING MAY BE CHOSEN FOR HEATING, COOLING, AND VENTILATING THE HOUSE?

Control of the temperature within the house is important in terms of family comfort. Throughout the ages control of temperature has been directed toward bringing the temperature up to a comfort level in cold seasons and in cold climates. More recently, knowledge of methods and devices for cooling the air down to a comfort level has developed. Ideas concerning the requirements for adequate ventilation have undergone changes. As a matter of fact thermal comfort in its fullest sense implies the application of a combination of the principles back of all of these. Today, the interest of ventilating engineers is centered upon the simultaneous control of air temperature, relative humidity, air motion, and the elimination of dust, smoke, pollens, and certain odors. The simultaneous control of these factors affecting thermal comfort and good health is known as air conditioning.

To understand the requirements of air conditioning it is important to comprehend the physiological reactions of the human body to heat. It is well known that the body, under usual circumstances, produces a definite amount of heat and that the environment usually carries off the heat at such a rate that the normal body temperature is maintained. The heat produced in the body may be five times as great when exercising violently as when reclining and at rest. The body possesses remarkable powers of adaptation which broaden the zone of comfort.

The feeling of comfort which each person derives under any set of air conditions is important. It is an individual matter and differs from person to person. Psychology and acclimatization or habituation to a climate are important influences therein. In certain individuals the psychologic factor is more influential than acclimatization. Such persons are uncomfortable in a room with closed windows regardless of the condition of the air, or they may be chilly in a room with an open window regardless of temperature. People living in tropical heat desire temperatures several degrees higher than that held as desirable in middle temperate regions. People living in the southern part of the United States like their houses a few degrees warmer than those living in the north. The process of acclimatization to any unfamiliar air condition places stress upon the heat regulating system of the body until adjustment is made. Bedroom temperatures should be lowered during sleeping hours, for people seem to sleep best when they have cool air to breathe. Other factors appearing to affect one's reaction derived from atmospheric conditions are age, sex, state of health, activity, and the amount of clothing worn.

The range of temperatures in which comfort is derived varies with the season of the year. Dry bulb Fahrenheit thermometer readings of from 68° to 72° in winter, and from 75° to 80° in summer are considered comfortable conditions by the majority of people if appropriate conditions of relative humidity and air movement are present. Great contrasts in temperatures are to be avoided in any season. Passing from overwarm rooms to cold outside winter air may accent propensities for colds, therefore high indoor temperatures in winter are not desirable. When summer cooling is used, the contrast between outside and inside temperatures has at times brought on heat stroke. Usually a difference of 10° to 15° between inside and outside temperatures has been found to be most healthful in summer. For instance, these differences are suggested when summer cooling is in use in the home:

Outdoor temperature	Indoor temperature
95°	80°
90°	78°
80°	75°

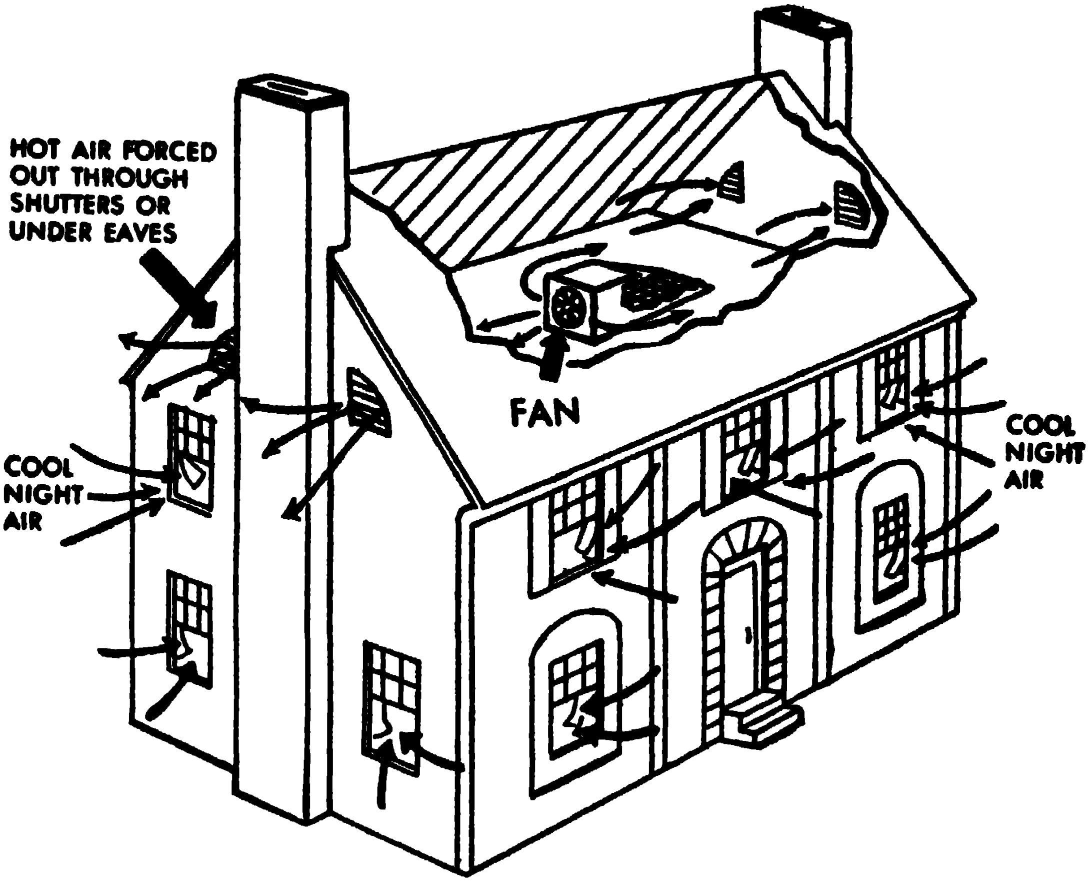
Two factors not always understood in the problem of maintaining comfortable temperatures in a dwelling are convection and radiation. It is well-known that heated air rises and that convection currents are thereby set up. The floor of a room will be cooler by several degrees than the ceiling. Temperatures might well be taken lower than the usual height of the thermometer. A temperature of 70° F. at knee-height under ordinary minimum winter conditions is usually suitable. With many forms of heating, the knee-height is far below the mean for the room as a whole. A knee-height temperature of 70° F. might imply a five-foot temperature of 76° F. and a ceiling temperature of 80° F. It is also a fact that the body is constantly losing heat by direct radiation to surfaces cooler than itself or gaining heat from surfaces warmer than itself. In this respect the temperature of walls and furniture is important. In a room with cold walls and large window area, or in a room with warm walls, air temperature may be a fallacious measure of comfort. The radiant effects resulting in heat storage in walls and roofs seem to be of great significance in maintaining room temperatures far above the comfort zone. It is known that the temperature in attics may be as high as 130° F. on a hot day. Any means to reduce this body of hot air, as an attic fan, would decrease the radiation from the attic to the ceiling. In a like fashion in cold weather, heat from rooms may be drawn off and lost through the ceiling.

The relative humidity or the relative moisture capacity of the air is one factor to which little attention is usually paid. The relation between the actual moisture content of the air and the total amount it would hold at any temperature is known as its relative humidity. It is expressed in percentage and denotes the intensity of the thirst of air for water. The amount of water vapor which air can hold varies with the temperature. The capacity increases with rising temperatures and decreases with lowering temperatures. A cubic foot of air at zero Fahrenheit has capacity for 0.564 grains of moisture; at 32° F. its moisture capacity is 2.113 grains; and at 70° F., 7.98 grains. Saturated air at low temperatures becomes only partly saturated when heated, and in that condition absorbs further moisture if such is available until its capacity at the new temperature is fully satisfied. Consequently, in winter dry air at a relatively high temperature may feel cooler than air of much lower temperature with a high moisture content, and conversely, in summer, moist air at a high temperature may feel warmer than air of the same temperature with a lower moisture content.

The most comfortable relative humidity has not been determined, but so long as the temperature is kept within usual limits, it is difficult to detect sensations of humidity when the relative humidity is between 30 and 60 per cent. In cold weather the relative humidity in homes often falls to as low as 10 to 15 per cent. Members of the household may experience difficulty from a drying effect on the membranes of the nose and throat. If frost does not form on a single pane of glass in zero weather, there is not enough moisture in the air. Ordinary attempts to increase the humidity, as placing pans of water on radiators or the usual water tanks in the furnace casing, are ineffectual since they are not capable of evaporating enough water to do much good. Ordinarily, to insure adequate humidification of the air in zero or subzero weather, provision should be made for the evaporation of at least one to one and one-fourth gallons of water per room per day. The most effective way to insure this amount of evaporation is to pass the air through water sprays. Forced humidification on a large scale may lead in zero weather to condensation of water on the walls and sometimes to the freezing of the moisture inside building materials used for the outside walls. In summer, in some climates, means to reduce humidity by dehydration has been found to alleviate the discomfort of heat. Various devices have been marketed to accomplish this end.

The effect of air movement on the feeling of comfort has long been recognized. The use of fans in summer contribute to comfort by increasing air movement, and hence the possibility of the evaporation of moisture from the skin. When fans are used they should render quiet service and be so placed as not to make any one position in the room seem the vortex of a wind storm. Many accidents occur because of failure to disconnect a fan before changing its position, or failure to screen the flying blades from the fingers of the incautious adult or the experimentally inclined child. For winter time, heating and ventilating engineers, after study of the effect of various air velocities on the sense of bodily comfort, recommend a rate of 15 to 25 feet per minute as satisfactory. Air currents created by the opening and closing of doors in the normal dispatch of household duties and affairs may be sufficient. Forced air movement from hot-air heating appliances is possible and may be used during both cold and hot weather. For hot weather, air movement from the heating appliances may be as much as 75 feet per minute. Attic fans may be used in warm climates to draw out the stored heat in the attic as well as the heat from the lower floors. Their action also produces a comforting movement of air.

A certain amount of air change is desirable to give the feeling of freshness to the air, preventing the accumulation of body odor, and avoiding mouth spray infection. Such air changes need only to amount to 10 cubic feet per person per


HOT AIR FORCED OUT THROUGH SHUTTERS OR UNDER EAVES
FAN
COOL NIGHT AIR
COOL NIGHT AIR

Courtesy B. F. Sturtevant Co.

Attic ventilation may assist in cooling the home during hot weather.

minute. With adequate air space this rate of air change will be brought about automatically in cold weather by normal leakage through walls and ceilings of the usual porosity and around doors and windows. In warm weather it can be obtained by opening the windows.

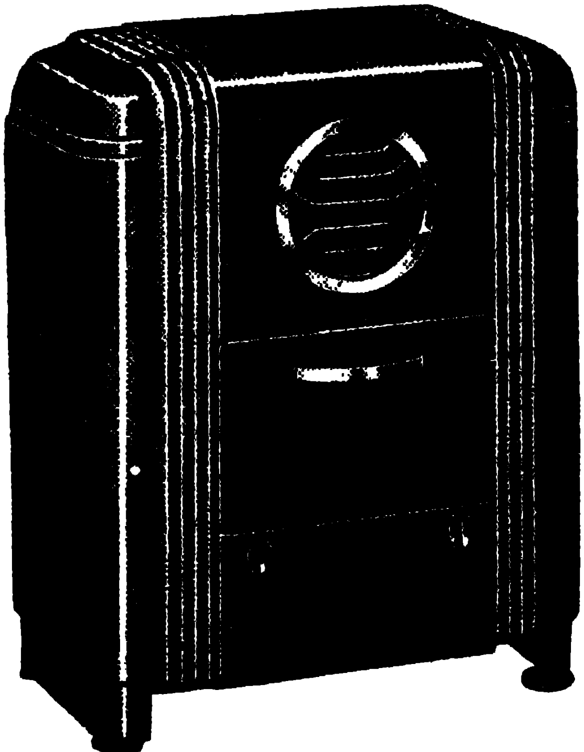
No one yet knows what the difference is between fresh and stale air except that the one is pleasant to breathe and the other is disagreeable. It is known that it is not an oxygen lack, but it may be related to the degree of ionization as outdoor oxygen exists in several different forms as O_2, O_3, and O_4. Stale air seems to be freshened when passed through an ionizing chamber that reactivates the oxygen. Be that as it may, air may be defiled by dust, smoke, pollen, fumes, or gases. Under ordinary circumstances, the presence of dust is believed to be not so much a matter of health, but rather a matter of nuisance, being offensive to one's sense of the aesthetic. It may be removed by the use of filters in the circulating ducts of hot-air heating appliances, and its entrance into the house can be largely prevented by proper construction features. The elimination of smoke, fumes, and gases is more difficult, and this fact accounts for the importance attached to the selection of a site free from sources of such defilement.

The whole problem of air conditioning is focalized in two phases of house structure: a construction which aids in checking the transmission of heat, both from within to without and from without to within, and the use of adequate equipment which controls the air conditions inside.

A tight construction is necessary to prevent infiltration of air through cracks and crevices, at joinings and around openings. In fact, the mere presence of doors and windows increases the transfer of heat. It is difficult to make a completely airtight construction there, and glass itself is a good conductor of heat. Weather-stripping around doors and windows is known to decrease considerably the amount of fuel necessary to heat a house. Weather-stripping may be made of wood, felt, or metal. Wood and felt are effective at first, but they may not remain so. Metal weather-stripping is efficient and permanent, and appears well when properly installed. In severely cold climates double glazing at the windows and outside doors is effective in preventing the transfer of heat to the outside.

Much heat may be lost through the walls and the roof of the house. The construction may be so poor that air circulates readily. Any construction alone, however, is ineffective in preventing transmission of heat. Helpful in filling up cracks and crevices and in stopping the transfer of heat through walls and roof are various kinds of insulation materials. Not only do they retard the transmission of heat through cracks, but they are usually materials which do not absorb heat readily. Insulating products are manufactured from a variety of raw materials. Those commonly used are: bagasse, cork, cornstalks, cotton, eel grass, flax straw, hair, jute, kapok, licorice roots, moss, paper pulp, wheat straw, and wood. In addition, gypsum, asbestos, limestone, glass, and various plastics are in use. These materials are manufactured in several different forms and are applied according to their nature. The most important types include:

1. Rigid insulation which is manufactured in panels of various sizes and in addition to insulating properties usually possesses structural strength.
2. Flexible insulating material which consists of a loosely felted fibrous mat usually covered on both sides with a layer of paper or fabric. It may be referred to as "blanket" or "quilt" insulation.
3. "Fill" insulation which is of powdered, granulated, or shredded material. It is used for filling spaces in wall, floor, and ceiling construction.
4. "Reflective" insulation which is a sheet of metal-foiled paper stretched across or between joists or studs. The paper may be foiled on one or both sides.



Courtesy Florence Stove Company

This cabinet space heater is one of a wide variety of models. It is equipped with two giant wickless burners easily lighted. Individual metering valve affords complete control of each burner. This type of cabinet heater delivers a continuous circulation of heated air and is widely used in rooms where a chimney outlet is not available.

The material of roofing is another important feature in preventing loss or absorption of heat. Metal roofing and some composition roofings absorb heat readily and hence may become a disadvantage in climates where the summer temperatures run high. Certain colors such as red, often used on roofs, are known to absorb solar radiation when used on exposed materials.

Although air conditioning is not concerned solely with heating or cooling of the air, heat control does constitute its major concern. When we consider the equipment in the house which actually brings about air conditioning, equipment has been available which controls temperature, relative humidity and air movements and which removes dust, smoke, pollens, and odors. Present ideas of the perfect air conditioning system require that it provide maximum human comfort in terms of temperature, relative humidity, and air movement; that it concentrate warmth where it is needed most; that it be clean, automatic in operation, and economical.

The simplest devices for heating a house are stoves, space heaters, and circulating heaters. These are followed by central heating systems using hot air, hot water, or steam. When a hot-air system is used the heat is distributed in the rooms by registers in the floor or wall, and when a hot water or steam system is used the heat is distributed by radiators or coils in the floor or walls. The table on pages 481 to 483 identifies the characteristics and uses of each of the types of heating systems.

The fuel supply used to heat for any of these types of central heating systems may be coal, coke, wood, sawdust, gas, oil or electricity, depending on the availability of the fuel and the amount of money desirable to spend for it. The cost of operation of any heating system is dependent upon the amount of heat to be supplied, the climate, the fuel available, the extent of insulation, and the tightness of construction of the house. Perusal of the following steps should help in approximating the cost of operation for any system:

1. Estimates of fuel cost for entire season may be secured from retailer of fuel or fuel-burning equipment.
2. Estimates of the power required to operate items of equipment, such as stoker, fan, thermostat, or others, may be secured from power companies.
3. Service calls and repairs may average about 2 per cent of the cost of the equipment serviced.
4. Interest on the investment may be based on one-half the cost.
5. Depreciation charges are based on the average life expected of the equipment.

TYPE OF HEATING SYSTEM	HOW IT OPERATES	OTHER CHARACTERISTICS
Heating stove, space heater, or circulating heater	A unit is installed in each room to be heated. Adjoining rooms may be heated somewhat by leaving the doors between the rooms ajar.	These have lowest initial cost. Heat may be distributed somewhat unevenly. They are often used in old houses or those not having basements.
Gravity warm-air heating system	Circulation of air depends upon the principle that cold air is heavier than warm air. Cold air flows from the floor of the first floor rooms through cold air registers to the bottom of the furnace casing. Here, the air is heated by contact with the heated surfaces of the furnace and rises to warm-air registers in all the rooms to be heated.	This system is economical to install and simple to operate. The furnace must be centrally located and heat pipes must slope upwards to the registers which are in or near the floor. This makes it more adaptable to a house with a compact plan, reduces the amount of usable basement area. The system is responsive to quick changes in heat demand. The heated air may be humidified by the use of an evaporating pan inside the furnace casing, but filters would restrict the flow of air. The addition of a fan and a filter and the alteration of the registers converts this system to a forced air system.
Forced warm-air heating system	A fan in the system maintains air circulation. Cold air from the rooms is drawn from the cold-air register through an air filter into the space between the furnace and the furnace casing. Moisture is added here and the air is warmed and passed to registers in each of the rooms to be heated. The heat pipes can be longer and smaller than those used for the gravity system.	The installation of this system is more costly than for the gravity system. It may be used in large structures having isolated rooms and in basementless houses. When the fuel is gas or oil it may be installed in the attic if desired. Registers are located in the ceiling, high or low in the sidewall, in the baseboard, or in the floor. When cooling coils are added the system may be used for air cooling. Use of the fan in summer offers some relief. This system is quick to respond to changes in heat demand.
Gravity hot-water heating system	Circulation of the hot water depends on the principle that cold water is heavier than warm water. The cold water flows downward through return pipes and mains to the bottom of the boiler. Here the water is heated	Least costly to install of the systems using water as a heating medium. It must be installed in a basement. The supply and return pipes must be fairly large to reduce friction. It is desirable for the supply pipes to be insulated. It requires an expansion tank located above the highest radiator or above the boiler. This system is somewhat

TYPE OF HEATING SYSTEM	HOW IT OPERATES	OTHER CHARACTERISTICS
	and as it warms it becomes lighter in weight, flowing upward through supply pipes to the radiators in the rooms.	slow in responding to temperature changes.
Forced hot-water heating system	A pump maintains the circulation of the water. Heated water from the boiler is forced through supply pipes to the radiators. Two types of piping systems are in use: The *one-pipe* system has one pipe which serves to supply the heated water to the radiator and to return the cold water to the boiler. The *two-pipe* system has two pipes for those purposes.	More costly to install than the gravity system. May be used in houses without basements and for heating isolated rooms. Not necessary to insulate the supply pipes. It requires connection with electricity. This system has a rapid response to changes in heating demand.
One-pipe steam heating system	A boiler generates steam which rises through a single main and supply pipe to the radiators. Air is forced out of the system through air valves or vents located on each radiator. The steam cools and condenses in the radiator and the water returns to the boiler through the same pipe which it came. This pipe must be larger than those of other boiler systems and they must be carefully pitched to avoid water pockets.	Comparatively inexpensive to install. The boiler must be installed in a basement. The heat cannot be modulated because the steam must be coming constantly or turned off completely to prevent the radiators from filling with water.
Two-pipe steam heating system	A boiler generates steam which rises in a supply pipe to the radiators where the air is forced out through thermostatic traps. The air and water but not the steam go into the return pipes to an air eliminator which ex-	Most costly system to install. Not suited to installation in a house without a basement.

Type of Heating System	How It Operates	Other Characteristics
	pels the air and returns the water to the boiler. Because there are separate supply and return pipes the radiator does not fill with water readily. The temperature delivered can be controlled at the boiler where a variation in steam temperature is possible and at the radiator where the amount of steam admitted can be varied.	
Panel or radiant heating system	Water is heated in a boiler and piped to spaces directly beneath the surfaces of ceiling, floor, or wall. The heated surfaces radiate heat to the room.	Usually more costly than the other water systems. Still in the experimental stage. The rooms may be subjected to overheating or to underheating during periods of rapid outside temperature changes.

6. Labor costs may be lacking entirely if the owner does all of the work. However, it may be necessary to include payment for furnace attendance and ash removal.

Automatic temperature controls for the heating system may be used with any fuel where the amount fed to the flame can be controlled mechanically. For instance, an automatic stoker can be used for coal, coke, or sawdust, the heat being regulated by the amount of fuel fed into the firebox and controlled by a thermostat. The flow of gas and oil can be regulated also by a thermostat. The thermostat itself should be installed on an inside wall of the most used room. The usual setting is from 70° to 72° F. for the daytime, and from 60° to 65° F. for night-time.

Air conditioning implies a control simultaneously of temperature, humidity, air movement, and purity. Although equipment is available for controlling all of these elements, initial cost is such as to tend to limit the control to heat, and

Courtesy Copper and Brass Research Association

Radiant heating is provided in the floor. Cement or other material will cover these pipes, which will be heated to provide radiant heat.

sometimes humidity and air movement. Several types of equipment are usable for the various situations. When choosing a central heating system, consideration should be given initial cost as well as cost of operation.

Suggested Activities

1. What means of insulating against heat or cold are used in your locality?
2. What devices are used for air-cooling?
3. What is the cost of heating houses in your locality? Make a spot survey of 5 family dwellings. Is there any correlation in this regard between the type of heating systems used, size of house, devices for saving fuel, and the average monthly cost? Bills for the cold months must be available. The form for this purpose is suggested on page 485.
4. Make a spot survey of five family dwellings to ascertain if air conditioning units have been installed.

ITEMS	1	2	3	4	5
Type of heating system					
Fuel used					
Size of house					
Number of rooms heated					
Temperature maintained in main rooms					
Devices for saving fuel					
Average monthly cost during heating season					
Average monthly cost per room					

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Problem 4. HOW MAY ADEQUATE ILLUMINATION BE CHOSEN FOR THE HOUSE?

The demands of civilization have made men more and more dependent on artificial light. Whereas for ages man was content to retire when night fell and daylight was past, many of his most interesting experiences now occur under artificial illumination. Without it, the greater part of the recreation of the average individual would be lacking, and that remaining would be markedly changed in character. Modern transportation would be greatly handicapped without artificial light of high quality. The work of the world would undergo reorganization on a daylight basis, and home life as we now know it would be greatly modified. The complexity of modern life has caused man to work in shifts, disregarding the cycle of the sun and to crowd those hours left from earning a sustenance with motoring, theater going, dining and various recreational activities alien to darkness. Consequently, man is dependent on artificial light to enable him to cope with present-day living.

The increase of the activities performed under artificial lighting has been accompanied with an extension of the demands made on eyesight. Probably 90 per cent of our experience and our usefulness depend upon our sense of vision, hence it behooves us not only to conserve our eyesight, but also to provide proper conditions for vision. Our visual organs, the eyes, were evolved under daylight environment; and for working and related activities, light having the prerequisites of daylight is most efficient.

Fortunately, with the increased demand for artificial light, it has become progressively cheaper, more efficient, and more abundant. It is the problem of the homemaker to accept light as the *source* and illumination, as the *effect* in the room. Illumination is defined as the amount of light falling on a surface from a light source. It is measured in foot-candles.[1] Illumination should be easy on the eyes and adequate for reading or working in all places where tasks are carried on. The usual inadequacies of illumination which affect eyesight adversely are insufficient amounts or intensities of light, glare, and poor distribution of light.

The amount of light or the level of intensity is a factor which affects the comfort of the eye and the clearness of vision. Under natural conditions a range of illumination is encountered varying from about 1/1,000 foot-candle in starlight to over 10,000 foot-candles beneath the summer sun. Although the human eye has a remarkable capacity for adjusting itself to these different intensities, exposure for long periods to either of these extremes is unsafe for the eye. Indeed, the very capacity for adjustment may cause the eye that is not operating with ease and accuracy to pass unnoticed. Eyes with the defect of astigmatism see better and with less fatigue under conditions of sufficient intensities of light. When intensity of illumination is sufficient it has been found that tenseness is less, heart-rate is closer to normal, rate of blinking is less, and general sensitivity of the visual sense is greater. *Nearsightedness,* especially in children, may be brought on by bringing reading material closer to the eyes in an attempt to see with inadequate intensities.

The amount of light desirable for different kinds of work has not been determined with finality. The recommendations for the amount of light for office, factory, and home have been repeatedly restandardized at successively higher levels as it has been recognized that visual tasks are facilitated by increased light, and as the production of artificial light has become cheaper and more abundant. It is known that visibility of any object is affected by four important factors: the size of the object, the contrast with its background, the time during which the eye has an opportunity to receive the image, and the brightness of the object. Improvement of any of these factors can compensate for a deficiency in one or more of the other three factors. In everyday life the easiest one of these factors to improve is the brightness factor, that is the amount of light reflected by the object. The brightness of an object can be increased by increasing the amount of light on it. Due to variation in local conditions, type of work done, the length of time the work is to be pursued, and the difference in eyesight of individuals, it is impossible to specify one intensity which is advisable for all. However, a range of values can be suggested as desirable for easy and comfortable seeing. This the Committee on Residence Lighting of the Illuminating Engineering Society has done. It suggests, however, that the upper values quoted should not be considered as limits or maximums, because higher intensities may be preferred or even necessary under some conditions.

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[1] A foot-candle indicates the intensity of illumination on a surface which is one foot from a standard candle and normal to its beam of light.

Some things decrease the amount of illumination from light bulbs. It is known that quantity of light within a room is greatly dependent upon the reflective qualities of the colors on floor, walls, and ceiling. Dark colors absorb light in great quantities and various colors reflect light in different amounts. Satisfying illumination is produced if the quantity of light is adequate when the floor, walls, and ceiling reflect light in the following percentages:

Floors reflect 10 to 20 per cent of light.
Walls reflect 35 to 55 per cent of light.
Ceilings reflect 65 to 80 per cent of light.

In rooms where work is done requiring considerable visual effort, as in the kitchen or utility room, higher reflective

ILLUMINATION VALUES FOR THE HOME[1]

Specific Visual Tasks *	Foot-candles Recommended
Reading	
Prolonged periods (smaller type)	40
Casual periods (larger type)	20
Sewing	
On dark goods, fine needlework	100 or more
Average sewing (prolonged)	40
Average sewing (periodic)	20
Writing	20
Children's study table **	40
Game tables	
Card table	10
Ping-pong	40
Kitchen	
Work counter, range, and sink	40
Dressing table mirror ***	20
Bathroom Mirror ***	40
Laundry	
Ironer, ironing board, or tubs	40
Workbench	40
General Lighting	
Entrance hall, stairways, and stair landings	5
Living room, library, sunroom	5
Dining room **	5
Kitchen	10
Bedroom	5
Bathroom	5

* The values listed for specific tasks are measured with a foot-candle meter placed on the work surface with the light-sensitive cell on the same plane as the work. The values listed for general lighting represent an average of a number of readings taken throughout the room on a plane 30 inches above the floor, with the light-sensitive cell held in a horizontal position.

** Where dining table is also used for home study by children or for other critical eye tasks, illumination specified for that task should be furnished.

*** Lighting values to be delivered on both sides of the face.

values may be desirable. The texture of the finish used is important in the distribution of light. A dull finish tends to spread or diffuse the light in all directions, while a gloss finish mirrors and reflects bright spots, producing a glare. The table on page 490 indicates the approximate percentage of light reflected by typical colors and finishes.

The condition and color of light bulbs and the character of lighting fixtures affect the amount of illumination possible from them. It is known that a higher level of illumination issues from one high wattage bulb than from two, each with half the wattage. Bulbs that have become blackened with use reduce the useful light output by about 10 per cent by the time the bulb is ready to burn out. Dust that accumulates on the light bulbs or the enclosing fixtures cuts down the amount of illumination possible. Colored light is usually undesirable for critical seeing, because the color actually produces less light per watt used, than white light.

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[1] Sub-committee on Recommended Practice of Home Lighting Committee on Residence Lighting, *Recommended Practice of Home Lighting*. Illuminating Engineering Society, 51 Madison Avenue, New York. June, 1945.

REFLECTION FACTORS OF TYPICAL PAINT, PAPER, AND WOOD FINISHES USED IN INTERIORS[1]

Color	Per Cent of Light Reflected
White	85
Light	
Cream	75
Gray	75
Yellow	75
Buff	70
Green	65
Blue	55
Medium	
Yellow	65
Buff	63
Gray	55
Green	52
Blue	35
Dark	
Gray	30
Red	13
Brown	10
Blue	8
Green	7
Wood finish	
Maple	42
Satinwood	34
English Oak	17
Walnut	16
Mahogany	12

To insure adequate light of good quality for all rooms, lighting experts recommend that careful attention be given the proper distribution of light. The eye is capable of adjusting itself to widely different quantities of light if contrasts are kept to a minimum. Outdoor contrasts as between the sky and the foliage of trees may be about ten to one.

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[1] Sub-committee on Recommended Practice of Home Lighting Committee on Residence Lighting, *Recommended Practice of Home Lighting*, p. 14. Illuminating Engineering Society, 51 Madison Avenue, New York. June, 1945.

Indoors during the daytime the contrasts are not far from this value except when shafts of sunlight are directly entering the room. At night, the usual forms of lighting produce contrast values far beyond those found in the daytime. The discomfort which results may seem to come because of too much light when in reality it is because of too much contrast. It has been said that for every increase in the quantity of light for a specific seeing task, there must be a matched increase in the quantity of general illumination. To reduce contrasts in lighting the usual procedure is to add some light which will distribute itself by means of reflection from walls and ceiling throughout the entire room. This may be accomplished by totally or partially indirect floor and table lamps which throw a good percentage of their light upward to be reflected throughout the room; by suitable central ceiling fixtures; by well designed wall brackets; and by decorative cornice lighting. Of course, from the standpoint of beautifying a room, we do not wish to distribute light so evenly that all high lights and shadows are eliminated. To provide proper distribution of light, giving the recommended ten-to-one contrast value, usually there should be overhead fixtures in all the principal rooms, as living room, dining room, library, and bedrooms. Furthermore, to supply local lighting in proper amounts through portable lamps, minimum requirements in wiring for these rooms specify that no point along the floor line in any unbroken wall space should be more than six feet from an outlet in that space.

In addition, it is important to know the manner in which the luminaire or lighting fixture distributes its light to the room. Each general type has its own characteristic quality of light and each varies from the others in quantity of light given off. The types of luminaires or lighting fixtures are as follows:

Direct and semidirect lighting emit light entirely or in the highest percentage downward. Such lighting provides the highest foot-candles per watt over the areas beneath, but usually creates varying density and harshness of shadow. Direct lighting is used for specific eye tasks and to create interest areas of light against the background of indirect lighting.

General diffuse lighting emits light in fairly equal proportions in all directions, and up and down. The fixture providing general diffuse lighting is usually of glass globe variety. To prevent glare the globe should be large enough and dense enough to completely conceal the light sources.

Semi-indirect and indirect lighting emit light in highest percentage or entirely upward to the ceiling for redirection downward. It provides less foot-candles per watt in the center of the room than others, but illumination is spread over a larger area than others and has less shadow and greater softness. Shallow rather than deep bowl forms distribute the light to advantage. Illumination solely from indirect light causes objects to seem to float.

The illustrations on pages 493 to 495 indicate the methods of distributing light and the luminaires which are used for this distribution.

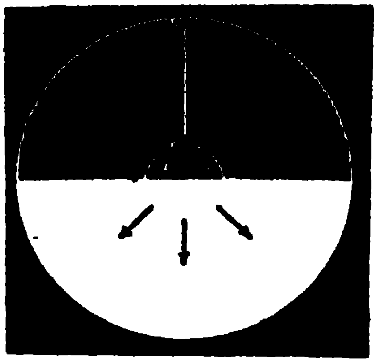
Aside from the illuminating value of lighting fixtures, cove lighting, panel lighting, and spot lighting have a decorative value. Cove lighting consists of a series of bulbs placed in a reflecting trough which throws an even distribution of light over the ceiling. Structural or translucent glass may be used to deflect or diffuse the light downward. This method of lighting is valuable to illuminate murals, scenic wallpaper, or library shelves.

Panel lighting consists of a broad source of low luminosity brought about through glass panels on about the same surface level as the wall or ceiling where they are located. The glass in front of the bulbs can be frosted, highly decorated, or carved. Elongated panels can be used effectively above a door, or in a window recess to illuminate colorful draperies. A lighted glass ceiling panel in a corner cupboard or in a cabinet with bibelots or books is effective. The top surface of a cabinet or table may illuminate an objet d'art.

Spot lighting is accomplished by an objective lens which permits light to be limited to an absolute edge. A picture or garden ornament may be the object so illuminated.

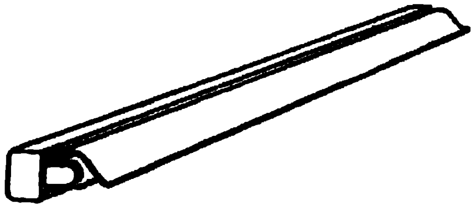
Glare is any brightness within the field of vision of such

MOST OF LIGHT EMITTED DOWNWARD

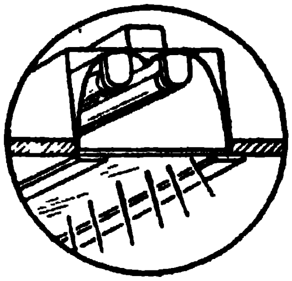


DIRECT LIGHTING

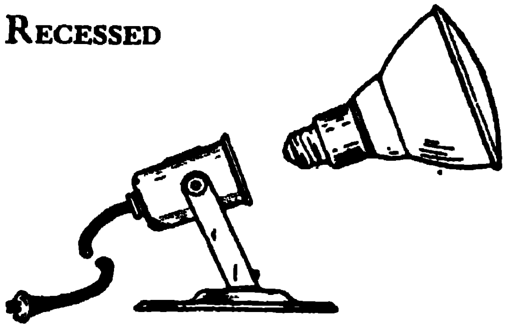
RECESSED



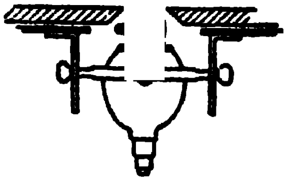
WALLBRACKET FLUORESCENT



RECESSED

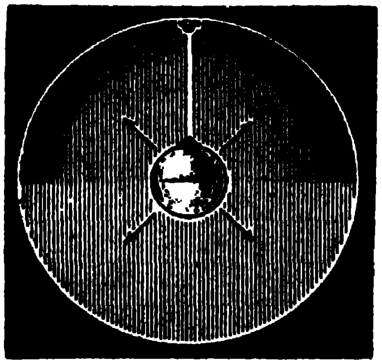


SPOTLIGHT

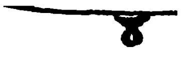


SPOTLIGHT

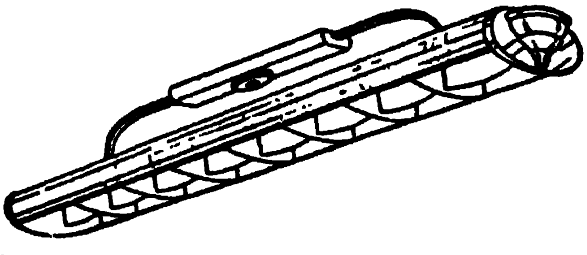
UNSHADED TUBULAR



SEMIDIRECT LIGHTING



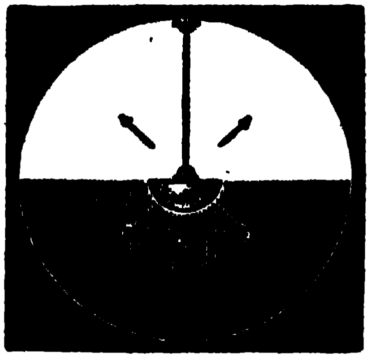
FLUORESCENT



FLUORESCENT

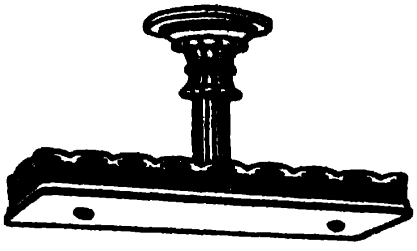
Courtesy Illuminating Engineering Society, *Recommended Practice of Home Lighting*

LIGHT EMITTED MOSTLY UPWARDS

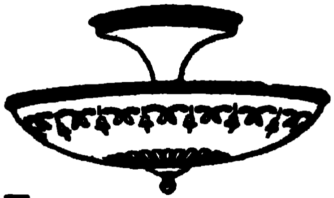


Semi-Indirect Lighting

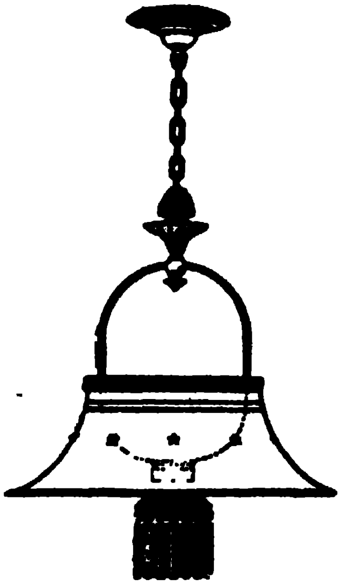
Fluorescent



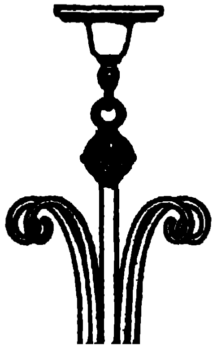
Fluorescent



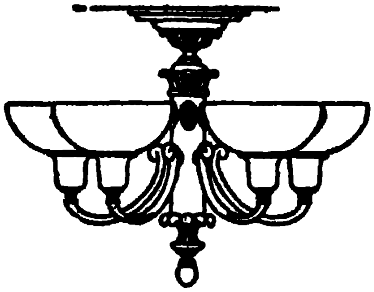
Fluorescent



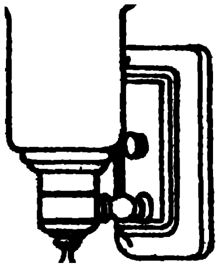
With Inner-Diffusion Bowl



With Inner-Diffusion Bowl



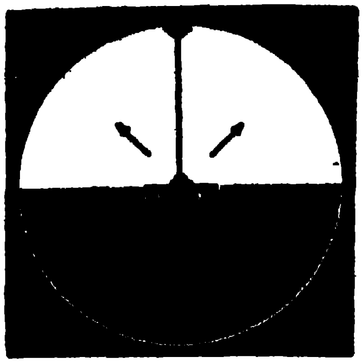
With Inner-Diffusion Bowl



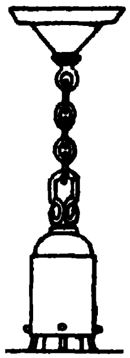
Wallbracket

Courtesy Illuminating Engineering Society, *Recommended Practice of Home Lighting*

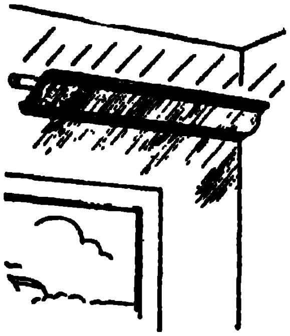
LIGHT EMITTED MOSTLY UPWARDS (Cont'd)



Indirect Lighting

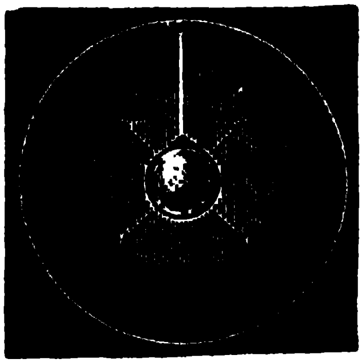


Totally Indirect

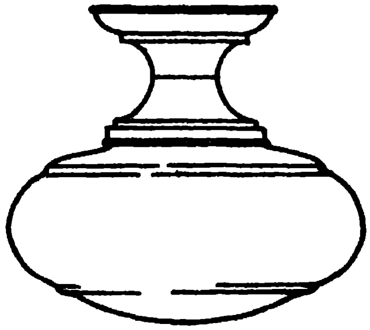


Cove

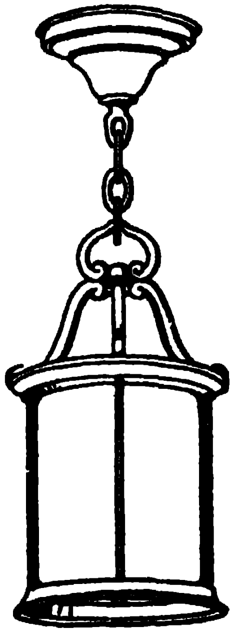
LIGHT EMITTED IN ALL DIRECTOINS

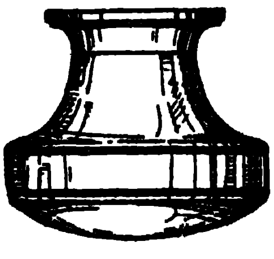


General Diffuse Lighting

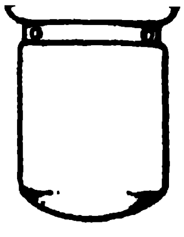


Enclosing Globe





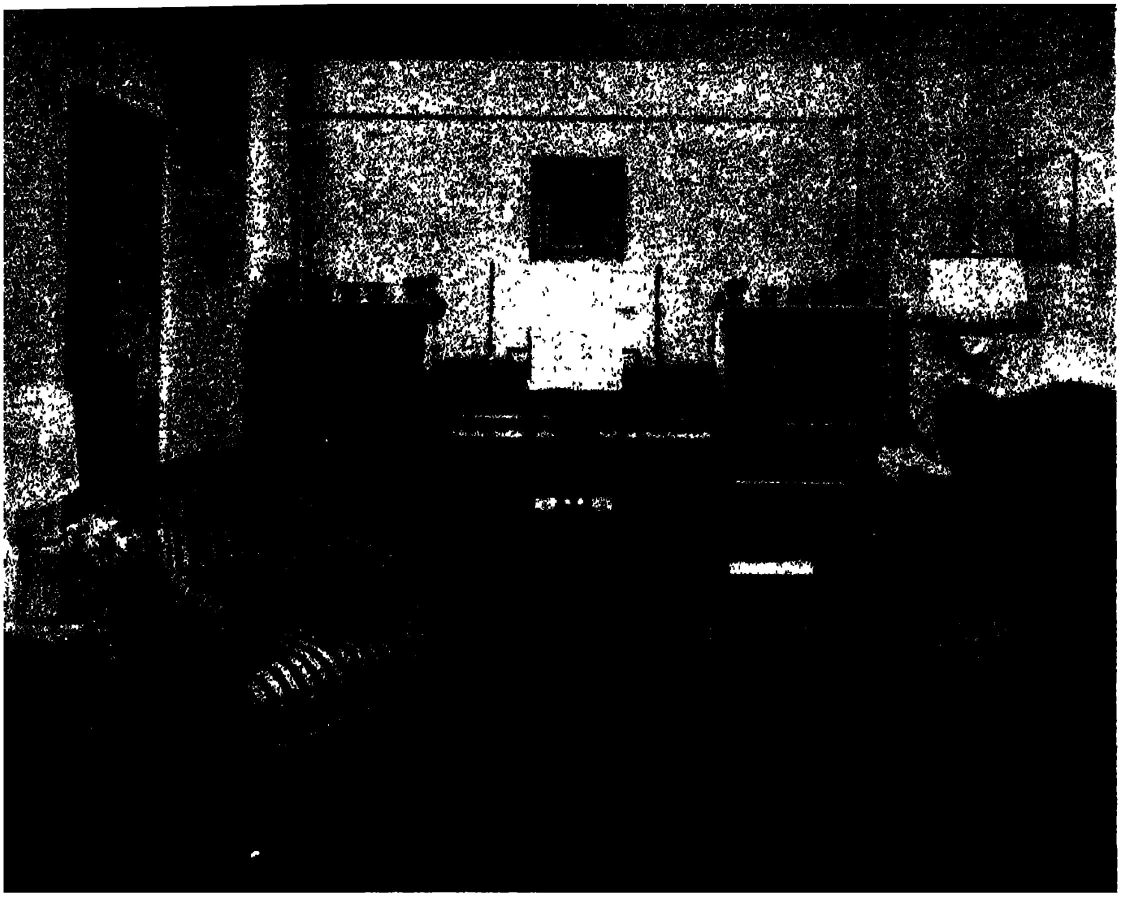
Enclosing Globe



Vapor-Proof

Lantern

Courtesy Illuminating Engineering Society, *Recommended Practice of Home Lighting*



Courtesy Detroit Edison Company

There is comfortable illumination at the piano provided by fluorescent lamps mounted on the back of a dropped valance.

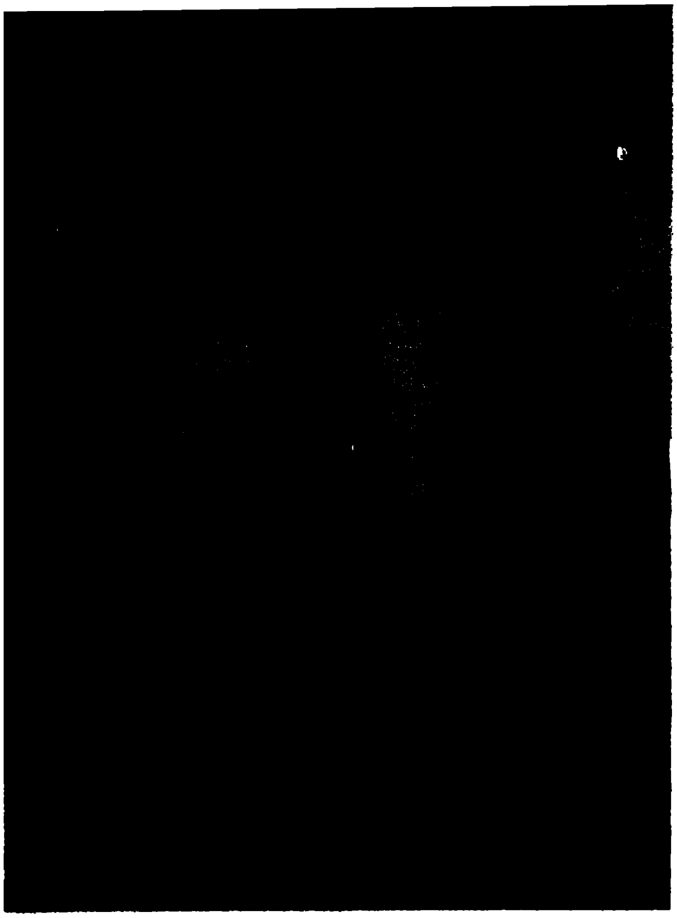
a character as to cause discomfort, annoyance, interference with vision, or eye fatigue. It is objectionable because when continued it tends to injure the eye and to disturb the nervous system; it causes discomfort and fatigue, thus reducing efficiency when working; it interferes with clear vision which further reduces efficiency and pleasure and in many cases increases the risk of accident or injury.

Glare is of two kinds: direct and indirect. Direct glare is produced by light coming from a bright source located directly in the field of view. It may also be produced because the total volume of light is too great or because the contrast with the background is too great. Indirect glare is produced by light reflected from an object not the primary light source. An example of indirect glare might be the reflection of a bare bulb from a shiny desk top or on glazed writing paper or a magazine. Indirect glare is sometimes more annoying than direct glare because it remains in the central part of the visual field. The length of time the eye is subjected to the fatigue caused by glare within the field of vision should be considered. No great discomfort may be experienced if the period is short, but longer periods cause extreme eye fatigue.

The principal causes of glare include:

1. *Brightness of source.* The light source may give off too high a candlepower per square inch of area. A glance at the sun proves that an extremely bright light source within the field of vision is capable of producing acute discomfort. To a lesser degree the filament of an incandescent electric lamp may have an annoying effect.
2. *Total volume of light.* The light source may give off too great a total candlepower in the direction of the eye. A high-wattage lamp in a frosted globe will prove quite as glaring as the exposed filament of a lamp having one-tenth the wattage in the same location. In the same way, an unshaded window often causes glare due to the large volume of light rather than to the high brightness of the sky.
3. *Location in the field of view.* A light source may be located at too short a distance from the eye or it may lie too near the center of the field of vision for comfort. The best way to avoid glare from this origin is to locate the source of light well above the eye level, if it is for general lighting, and also to screen the source well if it is for local lighting.
4. *Contrast with background.* The contrast may be too great between the light source and its darker surroundings. A light source viewed against a dark wall is more trying to the eyes than when its surroundings appear relatively light. In a like manner, when part of the field of view is highly illuminated and other parts only dimly illuminated, the eyes must adapt themselves every time the glance wanders from one level of illumination to the other.
5. *Time of exposure.* The eye may be subjected to the fatigue caused by a light source within the field of vision for a long period of time. Sitting at work while facing a sunny window at long range is tiring to the eyes, as is facing a bright light at any range.

Various methods are used to offset glare. Glare from an incandescent filament is reduced by diffusing the light through frosted or etched glass or through opalescent glass. Diffused



Courtesy General Electric Company

At the dressing table lamps at each side of the mirror provide good light on the face.

light is softened and if the diffusion is sufficiently great the light is uniform and shadowless.

Another method used to counteract glare is by the use of indirect lighting. By this method almost all, if not all, of the beams of light are directed from the source to the wall or ceiling, and from there are reflected to other parts of the room. The reflected light is softened, uniform, and shadowless.

A combination of the above methods of reducing glare is the semidirect and semi-indirect lighting systems. When these methods are used, a luminous bowl, or luminaire, placed under the light source allows some of the light to be diffused downward, and some to be thrown on the ceiling and reflected from there.

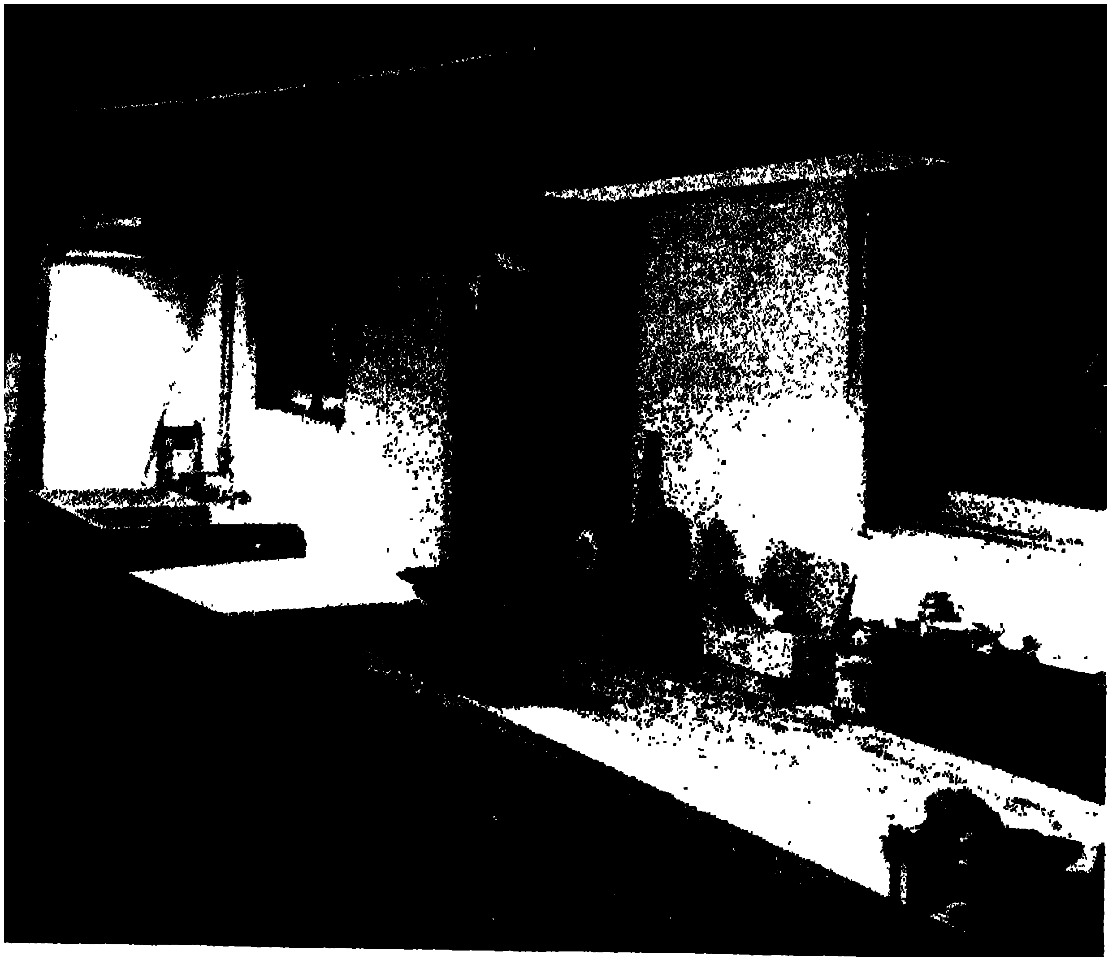
Completely indirect lighting should be used to the exclusion of direct lighting only in those rooms where no reading or precise work will be done. For critical seeing the use of portable lamps which emit some light to the ceiling and provide diffused light directly upon the visual task is advised. The shades of these lamps should not be completely opaque nor should they be highly translucent. To avoid further possibility of eye strain the light source should be located well above the eye level. The Illuminating Engineering Society has developed specifications for both portable and floor lamps which insure these conditions and a number of lamps which meet these specifications are on the market.

When direct lighting is used all of the beams of light are sent from the source of light directly to the place illuminated.

Such lighting is usually glaring unless highly diffused. However, in special cases, as in handling threads, sharp shadows add to visual efficiency.

A method which is helpful in reducing glare is the avoidance within the field of vision of any surface that is glossy or shiny. The erroneous belief that shiny surfaces, by their reflection of light, contribute to the illumination of a room has led to many glare hazards. As a matter of fact, as shiny a surface as that of a mirror reflects only about the same amount of light as does the dull surface of flat white paint. A glare hazard is created because glossy surfaces in large amounts act similarly to a mirror in that they reflect the image of the light source and produce highlights that are haphazard and garish.

An attribute of artificial light which is often overlooked is its spectral quality. This plays a role in the realm of aesthetics and psychology. Most of the living in a room is carried on under artificial illumination. Color schemes in a room should be tested by artificial light, because when they are keyed only to natural lighting they may lose the desired effects. Colors which tend to fade by filament light are blues, greens, and violets, while reds and yellows are increased in their warmth. The question is sometimes raised as to whether pleasing results can be expected when fluorescent light is used with existing room colors. Fluorescent light has relatively less red rays as compared to daylight, and filament light has much more red in its make-up than daylight. For this reason, under fluorescent light, blue, green, and some yellows will become intensified, and some of the warmer colors will tend to fade out. Until improvements in fluorescent lighting are possible it may be desirable to use both fluorescent and filament lighting in a room. The emotional appeal of illuminations is also worthy of note. Bright surroundings such as highly illuminated walls, ceiling, and furnishings, are stimulating. In a like manner, even more stimulation can be obtained from brilliant effects such as those from crystals, jewels, satins, metallic paints, or mirrored surfaces used in a discriminating manner. Conversely, flat lighting is a sedative. A balance be-



Top, Courtesy General Electric Company, *Bottom,* Courtesy General Electric Company

Top, fluorescent lamps give adequate illumination over the work bench and the laundry. *Bottom,* halls should be adequately lighted. When the light fixture is mounted close to the ceiling the open bulbs are not visible to those ascending the stairs.

tween great and slight contrast is pleasant, while sharp contrasts are exciting and produce restlessness. Slow and subtle changes in lighting are attractive, while sharp ones are distracting and unpleasant. In a similar fashion low intensities of illumination poduce subduing effects. Shadows are restful, while darkness may be mystifying and awesome.

Other questions are raised in regard to the use of fluorescent lighting. The use of fluorescent tubes does not require special wiring. They operate better on alternating current, however, than they do on direct current. They do require an auxiliary device or ballast which keeps the current under control and prevents the tube from burning out quickly. They also require a starter switch which preheats the electrodes on each end of the fluorescent tube and then permits the light to come on. This accounts for the lag in lighting when the switch is turned on. Both of these devices are usually a part of the fixture and operate automatically when the lamp or wall switch is turned on. Fluorescent tubes burn about two and one-half times as long as filament tubes and they provide about twice as much light for the same power as the filament bulbs. The wattage of fluorescent tubes is determined by the size and length of the tube. It is necessary, therefore, to determine what wattage of fluorescent tube is desired before making the installation. Fluorescent tubes have bipin bases inserted into special sockets which are made to accommodate them. These tubes have some of the inherent characteristics of radio broadcasting stations and may produce an interference in the radio unless located at least six feet away from it.

Rules to follow in creating an interesting and comfortable illumination for a room are:

1. The lighting must be interesting and aesthetically pleasing.
2. The lighting must be distributed so that there is enough everywhere.
3. No uncovered light source should be visible in the line of vision.

The table on pages 502 to 508 indicates recommendations for illuminating the various rooms of the house.

PRACTICAL RECOMMENDATIONS FOR ILLUMINATING THE VARIOUS ROOMS OF THE HOUSE[1]

Room	Recommendations	Fixtures Needed	Wattage Required
Living Room	A high degree of flexibility needed for the varied activities in family living. This is provided by:		
	I. General lighting to give soft background lighting for more comfortable use of portable lamps; lighting for game tables without moving portable lamps; convenient over-all room light when entering the room; and flexibility for various occasions. As fixtures increase in size and are hung close to the ceiling, they become less conspicuous.	1. Ceiling center fixtures.	
		a. Semi-indirect close ceiling; min. diameter 14 inches; hang not less than 7′ 6″ above the floor.	a. Min. watts—filament—150 or Min. watts—fluorescent—80.
		b. Semi-indirect suspended min. diam. 14 inches.	b. Min. watts—filament—150.
	Should distribute light to the ceiling and sidewalls and diffuse downward light throughout the room.	c. Multiple-arm, semi-indirect. Suspended from ceilings 9 feet high. Min. diam. each bowl—5 inches.	c. Min. watts—filament—40 per bowl.
	Wall brackets and urns offer additional general illumination. Usually placed about 5 feet, 6 inches above floor near casements to save wall spaces for furniture and pictures.	2. Wall brackets and urns	
		a. Wall bracket	a. Min. watts—filament—15. Single-arm—min. walls—25.
		b. Wall urn, semi- or totally indirect.	b. Min. watts—filament—60.
	Skillfully applied and balanced built-in lighting permits effects for lighting or decoration.	3. Built-in lighting	
		a. Recessed directional side wall	a. Filament tubular lamp 20–40 watts per running foot, or fluorescent—10 watts per running foot.
		b. Lighted cornice over windows	b. Same as above.

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[1] Adapted from Subcommittee on Recommended Practice of Home Lighting Committee, *Recommended Practice of Home Lighting*. Illuminating Engineering Society, New York, June, 1945.

Room	Recommendations	Fixtures Needed	Wattage Required
Living Room		c. Dropped valances for side-wall lighting	c. Same as above.
	II. Local lighting to insure desirable amounts of light for reading, sewing, and other visual tasks. Provided by portable lamps which should be located not more than 30 inches from the object to be seen. Walls and floor should be sufficiently lighted to avoid high contrasts between visual task and the surroundings.	1. Lamps for flat-top desks and tables overall height 19 inches to 28 inches. Shade diameter 14 inches to 18 inches.	a. Min. watts—filament—100—150 or min. watts fluorescent 30–40.
		2. Floor lamps overall height 50 inches to 58 inches. Shade diameter 16 inches to 20 inches.	a. Min. watts—filament—150–500
Dining Room	Dining table is the center of interest in any space where it is located. Good illumination over it produces sparkle on table appointments. If table is used for study, sufficient well-diffused light should be provided.		
	When a ceiling fixture is suspended over a table, it is a part of the grouping and should be 30 inches to 36 inches above table top.	1. Ceiling fixture. a. Semi-indirect with downlights suspended.	a. Min. watts—filament—150.
		b. Shaded candle fixture, suspended.	b. Min. watts—filament—25 per candle.
	When the dining table is used for study or other activities the downward light should be diffused.	c. Semi-indirect with inner diffusing bowl.	c. Dinette, min. watts—filament—150. Dining room, min. watts—filament—300.
	A close-to-the-ceiling fixture may be used but unless designed with a downlight feature it will not highlight the table as well as a suspended unit.	d. Semi-indirect, close to ceiling.	d. Min. watts—filament—150 or Dinette, Min. watts—fluorescent—60. Dining room, min. watts—fluorescent—80.

Lighting Table Continued

ROOM	RECOMMENDATIONS	FIXTURES NEEDED	WATTAGE REQUIRED
Dining Room		e. Multiple-arm, semi-indirect.	e. Min. watts—filament—40 per bowl.
	When placed right, wall brackets add a pleasing note of decoration and enliven the walls but they should not be used alone.	2. Wall brackets Same as for living room	Same as for living room.
	Built-in lighting may give good general lighting or may be decorative. Lighting installed on the top of high cabinets are of this nature.	3. Built-in lighting a. Over-cabinet lighting.	a. Filament tubular lamps, min. watts—20–40 per running foot or fluorescent—10 per running foot.
		b. Cove lighting	b. Same as above.
	Downlights that are recessed in the ceiling give dramatic emphasis when directed on the table. Other lighting must be provided to reduce contrast.	c. Direct spot lighting.	c. Filament. special equipment and special bulb.
Bedroom	Lighting in the bedroom should make easy the activities of dressing, applying make-up, reading, sewing, studying, or other visual tasks desired to be done there.	1. Ceiling fixture a. Semi-indirect	a. Min. watts—filament—120.
		b. Semi-indirect multiple arm.	b. Min. watts—filament—40 each bowl.
		c. Semi-indirect, fluorescent	c. Min. watts—fluorescent—40.
	In children's rooms the center light may be indirect because the fixture has no great brightness and is comfortable to view when reclining.	d. Indirect.	d. Min. watts—filament (silvered bowl bulb)—150.
	Provision for light for make-up may be built-in, or special brackets over or at the side of mirrors. Light should be directed toward the face and not the mirror. The dresser top should be mirrored to	2. Built-in fixtures. a. Direct lighting, recessed box over a dressing table	a. Min. watts—filament—180, fluorescent—40.
		b. Direct lighting recessed box beside a mirror.	b. Min. watts—fluorescent—10 per run-

Room	Recommendations	Fixtures Needed	Wattage Required
Bedroom	get minimum face shadows and fullest lighting benefit under the chin.		ning ft.
		3. Brackets a. Beside or over a mirror.	a. Min. watts—fluorescent—20–40 watts.
		b. On the wall beside door mirrors or over a pier mirror; shade 10 in. long and 8 in. deep.	b. Min. watts—filament—100.
	When built in lighting is not possible, portable lamps are needed for applying make-up, reading, or other activities.	4. Portable lamps. a. Vanity lamps for dressing tables and dressers. Lamp height over-all, 20 inches to 26 inches. Shade diameter 8 inches to 10 inches.	a. Min. watts—filament—60–100, fluorescent—15–20.
		b. Wall lamps, for reading in bed or for make up. Lamp height over-all, 50–60 inches above the floor, or in relation to the object to be illuminated.	b. Min. watts—filament—60–100 or 100–150; fluorescent—15–40.
		c. Floor lamp near a reading chair, same as a living room.	c. Same as living room.
Bathroom	The lighting at the mirror is the most important where shaving and applying make-up goes on. At present, two brackets, one on either side of the mirror, is best solution. If only one lighting outlet can be provided, it may be installed over the mirror.	1. Brackets a. Semi-indirect with glass shade, 4 inches in diameter.	a. Min. watts—filament—60.
		b. Tubular	b. Min. watts—filament—100; fluorescent—15–20.
		c. Semi-indirect with lens light.	c. Min. watts—filament—100.
	Except in small bath-	2. Ceiling fixtures	

Lighting Table Continued

ROOM	RECOMMENDATIONS	FIXTURES NEEDED	WATTAGE REQUIRED
Bathroom	rooms a ceiling fixture should be provided, ceiling fixtures or mirror brackets should be controlled by a switch inside the bathroom door. When two doors are provided there should be a switch at each entrance. Enclosed showers should have a vapor-proof ceiling light controlled by a switch outside the compartment.	a. General diffuse enclosing globe. Min. diameter, 10 inches.	a. Min. watts—filament—100.
		b. Semidirect, close ceiling. Min. diameter, 12 inches.	b. Min. watts—filament—120.
		c. Semidirect close ceiling.	c. Min. watts—fluorescent—30.
		d. Vapor-proof shower light.	d. Min. watts—filament—60.
Kitchen, laundry, and garage.	Serviceable kitchen lighting requires that light be distributed generally over the room and directed specifically on work areas, as at the sink, the range, work surfaces, and dining table if there is one.	1. Ceiling fixtures	
		a. General diffuse enclosing globe. Min. globe diam. 12 inches.	a. Min. watts—filament—150.
		b. Totally indirect. Min. diam. 14 inches. Install low enough to give good spread of light to the ceiling.	b. Min. watts—filament (silvered bowl bulb)—200.
		c. Semidirect.	c. Min. watts—fluorescent—80.
	Local lighting over sink, range, or work surfaces may be brackets or built-in.	2. Local lighting.	
		a. A smaller ceiling fixture.	a. Min. watts—filament—100; fluorescent, 40.
		b. Built-in downlight recessed in the ceiling in a furred-down section between the cabinets over the sink.	b. Min. watts—filament—180; fluorescent—60.
		c. Wall bracket, tubular, shaded or installed under wall cabinets.	c. Min. watts—filament, 20–40 per running foot, fluorescent 10 per running foot.
		d. Wall bracket, with lens, light.	d. Min. watts—filament—60.

ROOM	RECOMMENDATIONS	FIXTURES NEEDED	WATTAGE REQUIRED
Kitchen, laundry, and garage.	Serviceable lighting in the laundry requires that light be directed on the work areas such as wash tubs, ironing board, ironer, and counters or sorting table.	3. Laundry	
		a. General diffuse enclosing globe.	a. Same as kitchen.
		b. Direct, shallow-dome reflectors.	b. Min. watts—filament (silver bowl bulb)—150.
		c. Direct, shaded fluorescent.	c. Min. watts—fluorescent—40.
	The garage may have one or more fixtures as required.	4. Garage	
		a. Direct, shallow-dome reflectors.	a. Same as laundry.
Entrances, halls, and closets.	At the entrance, brackets that provide downlight on the steps are desirable. When a porch is provided, a suspended lantern on the porch ceiling will light the steps safely. Light coming from clear glass panels is blinding and should be avoided. When a doorway is slightly recessed, a light box is effective set in the soffit above. Space between garage and the house, as well as parts of of the yard or garden, can be illuminated with a flood lamp set under the eaves, and controlled by a switch in the house.	1. Entrance	
		a. Lantern bracket Min. diam. 6 inches.	a. Min. watts—filament—40.
		b. Ceiling lantern Min. diam. 6 inches	b. Min. watts—filament—40.
		c. Light box.	c. Min. watts—filament—60–100.
		d. Projector flood-lamp, or a bulb in an angle reflector.	d. Min. watts—filament—150.
	A lighted house number with numerals three inches high will give visibility up to 75 feet. They may be located as a part of the entrance light, in a recessed box located in the house wall or steps or in an applied box as a part of the door-bell circuit.	e. Recessed house number	e. Min. watts—filament—3 to 7.
		f. Attached house number	f. Filament, special voltage lamp.
		2. Halls	
	Lights in halls should illuminate the stairs for the full flight. The style and size of fixture should harmonize with the character of the hall. Loca-	a. General diffuse lantern—min. diam. 8 inches.	a. Min. watts—filament—60.
		b. Semidirect,	b. Min. watts—

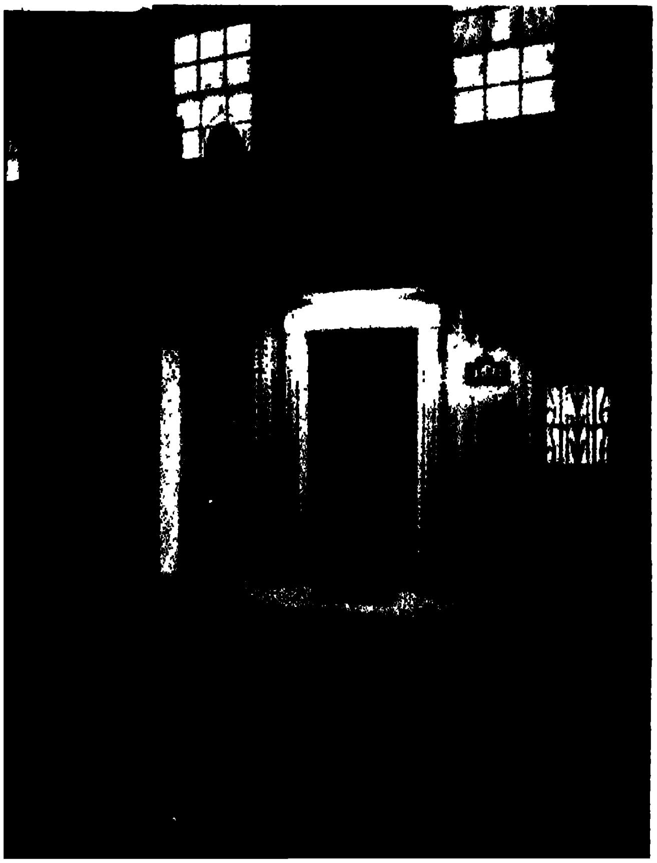
Lighting Table Continued

Room	Recommendations	Fixtures Needed	Wattage Required
Entrances, Halls, and Closets.	tion of the fixture should prevent visibility of the lighted bare bulbs. Lights for stairs should have switches at both top and bottom of the flight.	close to ceiling —min. diam. 12 inches.	filament—80.
	A light in a closet is desirable unless light from the adjacent room is adequate, or the closet is less than 9 sq. feet or not more than 18 inches in depth. A hall-lighting fixture may be located in relation to a hall closet.	3. Closets. a. Porcelain pull diam. socket mounted over the door frame.	a. Min. watts—filament—25–60.
		b. Semidirect close to ceiling; min. diam. 10 inches.	b. Min. walls—filament—60.

Various conveniences have been developed to facilitate the use of lighting and appliance outlets. A narrow channel having inconspicuous outlets every six inches of its length may be incorporated in the baseboard outlet or at table height in the kitchen where it may be necessary for a number of electric devices to be in simultaneous use. A strip outlet provides two continuous grooves at the proper distance apart to receive a plug.

Glareless and effective lighting over an entrance are provided from a light box over the door.

Courtesy General Electric Company



A master switch installed in the owner's bedroom can be wired to throw on one or more lights in any or all rooms in the house; these cannot then be turned off by any local switches. Such a device is a safety measure against burglarism. Other improvements provided by the lighting system in the home may include: sun lamps for cold-morning warmth; germicidal lamps for sickrooms and air conditioning; infrared lamps for heat treatments and for drying the laundry, small lamps for baseboard and keyhole lighting; and "black" light to activate fluorescent materials for decoration.

Suggested Activities

1. What are the inadequacies of illumination which affect eyesight adversely?
2. Amount of light

LAMP BULBS OF DIFFERENT WATTAGES PRODUCE ILLUMINATION IN VARYING AMOUNTS

Size of Bulbs	Foot-candles at 2 Feet	Comment
10 watt clear		
40 watt clear		
15 watt frosted		
15 watt fluorescent		
30 watt frosted		
30 watt lumaline		

FACTORS OTHER THAN WATTAGE OF LIGHT SOURCE WHICH AFFECT THE AMOUNT OF USABLE LIGHT

Color	Foot-candles at 2½ Feet	Comment
Light bulbs		
40 watt clear		
40 watt orange		
40 watt frosted		
100 watt clear		
100 watt blue		
Lampshade lining		
White		
Yellow		
Orange		
Green		
Red		
Blue		
Purple		
Black		
Wall finish		
Light		
White gloss		

COLOR	FOOT-CANDLES AT 2½ FEET	COMMENT
Flat white		
Gray		
Yellow		
Buff		
Green		
Blue		
Medium		
Yellow		
Buff		
Gray		
Green		
Blue		
Dark		
Gray		
Red		
Brown		
Blue		
Green		
Cleanliness of bulb and reflector		
Floor lamp		
Bulb and reflector bowl dusty		
Same bulb and reflector bowl cleaned		
50 watt frosted		
50 watt blackened		

3. Distribution of light

TYPES OF LUMINAIRES USED TO DISTRIBUTE LIGHT	DIRECTION OF LIGHT. SKETCH THE LAMP OR FIXTURE.	WATTS TO PRODUCE 10–20 FOOT-CANDLES	QUALITY OF LIGHT	SUGGESTED USE
Direct lighting				
Semidirect light				
General diffuse				
Semi-indirect				
Indirect				

EFFECTS ON DISTRIBUTION OF LIGHT OF CHANGES IN HEIGHT OF STANDARD SHADE AND REFLECTOR BOWL

Bulb	Standard	Shade	Shade	Reflector	Comment on Distribution of Light
40 watt	Low	Straight side	Opaque	None	
100 watt	Low	Straight side	Opaque	None	
100 watt	High	Straight side	Opaque	None	
100 watt	High	Flared	Opaque	None	
100 watt	High	Flared	Translucent	None	
100 watt	High	Flared	Translucent	Diffusing reflector	

4. Glare (raw irritating light)

Principal Causes (examples)	Suggestions for Remedy
Brightness of source.	
Total volume of light.	
Location in the field of view. .	
Contrast with the background. .	
Time of exposure.	

5. Light measurements at major "seeing spots" in a room. Is the illumination adequate for the tasks to be done there? How can it be made adequate?

Purpose	Foot-Candles		Recommendations		
	This Room	Recommended Standard *	Kind of Shade or Bowl	Location	Foot-Candles Obtained
Entrance hall, Stairway.		5			
Living room					
General.		5			
Conversation.		10			
Card playing.					
Reading or writing					
Prolonged.		40			
Periodic.		20			

* From *Recommended Practice of Home Lighting*. Illuminating Engineering Society, June, 1945.

Table Continued

Purpose	Foot-Candles		Recommendations		
	This Room	Recommended Standard *	Kind of Shade or Bowl	Location	Foot-Candles Obtained
Studying or Playing piano		40			
Sewing					
Dark goods		100 or more			
Av. prolonged		40			
Av. periodic		20			
Dining Room					
General		5			
Dining table		10–20			
Reading or writing		20–40			
Bedroom					
General		5			
Dressing table mirror		20			
Reading or sewing center		20–40			
Bathroom					
General		5			
Mirror		40			
Kitchen					
General		10			
Work counters, range, and sink		40			
Laundry					
General		5–10			
Ironer, ironing board, tubs		40			

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Problem 5. WHAT CONSTITUTES ADEQUATE AND CONVENIENT ELECTRIC WIRING FOR A HOME?

Electricity has become important in American homes because it enables a great deal of enjoyment in family living and reduces labor in carrying on the work. The use of electricity by the average family has increased because more appliances are being used to provide entertainment and enjoyment and to do work. Although such tasks as heating, cooking, and refrigeration can be performed also by gas, oil, and other sources of energy, electricity is widely used for doing them and there are certain things that electricity alone can do.

When planning for the use of electricity it is important to consider certain parts of the electrical system which supplies the power. Electric power is conducted to the place of use through wires known as conductors which are an essential part of the modern house structure. The power is made usable through the use of outlets, switches, and other controls which are also an essential part of the house structure. Appliance plugs and cords are also necessary in some cases for the use of the power but are separate from the house structure.

Some of the appliances in use have special requirements for wiring and their location should be carefully planned. In addition it is desirable to have an understanding of some of the limitations in the electric system.

The best approach to a consideration of the layout of the electrical system is first to determine the electrical appliances and lighting that will be needed.

The electrical equipment requirements of families differ with their activity needs and with their ability to meet the initial cost of the equipment and the expense of operating it. The usual fixed appliances for which a family may wish to plan space and wiring are listed on this page.

FIXED ELECTRICAL EQUIPMENT

Appliances	Usual Wattage	
Kitchen		
Range	7,000 to 14,000	
Refrigerator	300	
Dishwasher	500	
Garbage disposer	500	
Laundry	Normal	water extractor in use
Washer—wringer	375	450
Washer—spinner	375	800–1600
Washer—automatic	350	800–1200
Ironer		1200–1650
Clothes dryer		4,500
Bathroom		
Heater (built-in)		1,000 to 1,500
Heating room		
Water heater		750 to 3,000
Furnace devices		
Blower		300
Motor		400
Precipitron		60
Cooling Unit		3,100
Home freezer		350

It may be that other fixed appliances are desired such as built-in ventilating fans in kitchen, laundry, or attic; a hot plate in the laundry; or various signal systems. If all the fixed appliances desired cannot be purchased at the beginning, space and electrical capacity should be planned for the items concerned.

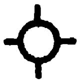
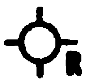
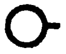
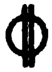
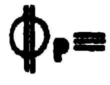
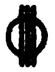
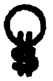
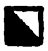
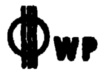
The number of portable electric appliances used by a family affect the design of the wiring, the location of outlets and the space necessary for storage of the appliances. Although the list on this page is not complete, it does indicate some of the major portable electric appliances and their wattage.

PORTABLE ELECTRICAL APPLIANCES

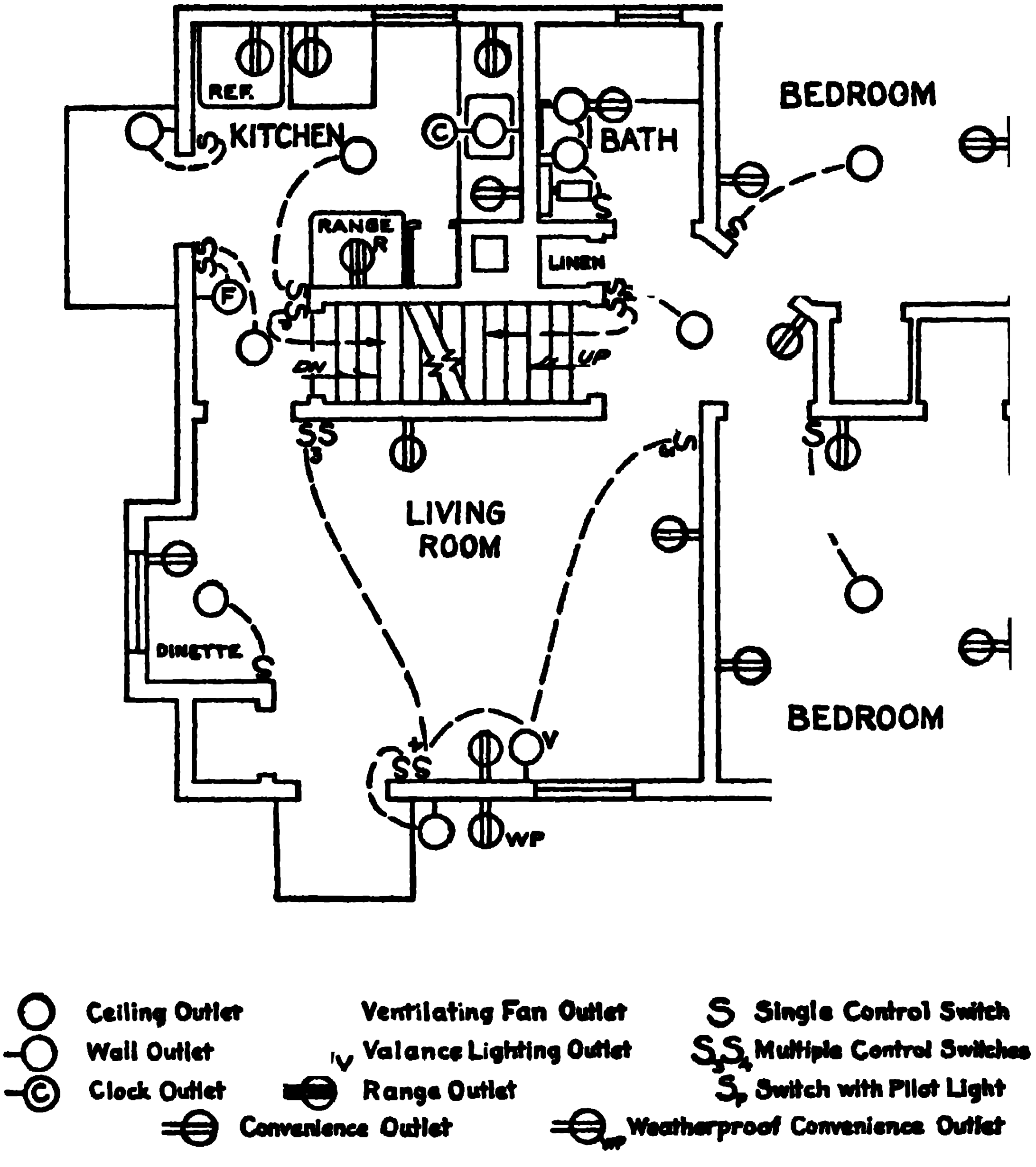
Appliances	No. Usually Found in a Home	Usual Wattage
Coffee maker	1	up to 1,000
Table grill	1	up to 1,000
Waffle baker	1	up to 1,000
Roaster	1	1,650
Toaster	1	up to 1,000
Food mixer	1	100
Hand iron	1 to 2	up to 1,100
Vacuum cleaner	1	400
Sewing machine	1	75
Shaver	1 to 2	10
Curling iron	1 to 2	20
Radio		
Standard Broadcast	2 to 6	50 to 150
Television	1 (or none)	500
Clock	3 to 5	2 to 10
Radiant heater	1 to 2	1,000
Sun lamp	1	400
Heating pad	1	60
Heating blanket	1	215
Fan		
Large	1 to 2	110
Small	1 to 2	90
Motor on lathe or other tool	1	300

In addition to the portable appliances there are fixtures and portable lamps that provide illumination to the home. Provision should be made for outlets for ceiling fixtures, wall brackets, lights, portable lamps, lighting coves, or other devices. The first choices among fixed or portable appliances should be made in those considered essential; then others may be selected which are desired because they contribute comfort.

Having determined the fixed and portable electrical appliances which will be used, the next step is to locate the outlets needed so that the various pieces can be used at the places most convenient to do the jobs required of them. Outlets commonly regarded as necessary include those for lighting, switch, convenience, and special-purpose outlets. When making a plan for the location of these outlets there are certain symbols used to indicate the various types. The symbols and their meanings follow:

	Lighting outlet in ceiling used with wall switch control
	Lighting outlet in ceiling (pull-chain switch control)
	Lighting outlet in wall (bracket type fixture)
	Twin receptacle or convenience outlet
	Twin receptacle or convenience outlet (polarized and arranged for grounding of appliance frame.)
	Three-pole receptacle or heavy-duty outlet.
	Switch and single-convenience outlet.
	Load center or main disconnect.
	Waterproof heavy-duty outlet.
S	Single-pole snap switch.
S^3	Three-way switch for controlling light from two locations.
S^4	Four-way switch for controlling from more than two locations.
S_p or S^3_p	Snap switch with pilot light.

The number of outlets should be sufficient and so placed that long extension cords will be unnecessary. These present two hazards: that of tripping family members and that of causing short circuits when the cords become worn. The location of outlets should facilitate the most desired scheme of placement of furniture and the arrangement of decorative objects. Recommendations and suggestions for number and location of outlets follow:



Wiring approved by the NATIONAL ADEQUATE WIRING BUREAU

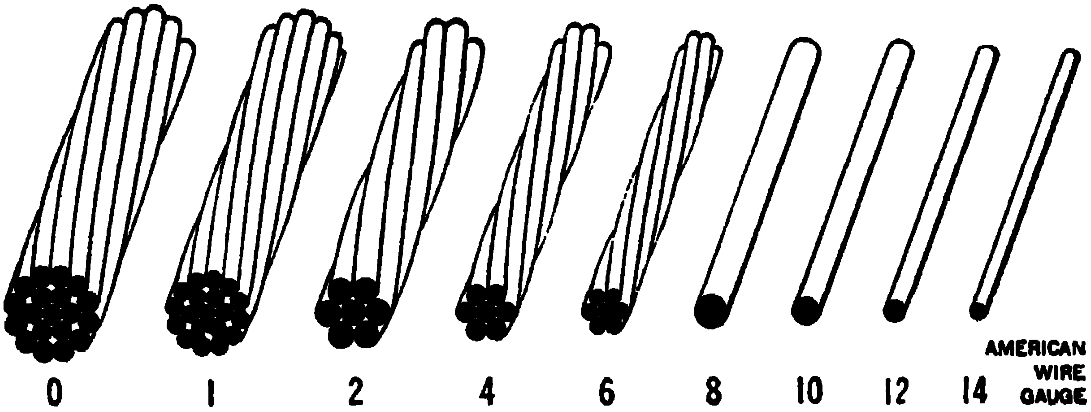
1. At least one ceiling outlet for light fixture in every room. If the room is twice as long as wide there may be more than one outlet.
2. A lighting outlet at each important work center or make-up center.
3. A lighting outlet in each closet wider than 18 inches.
4. A single-pole switch at each entrance door or three-way switches may be desired if commonly used doorways are more than 10 feet apart.

5. A pull-chain lampholder may be used at some work centers and in closets.
6. Automatic door switches may be desired in closets.
7. A master switch which turns on lights located at various points inside or outside the house independently of local switch controls, may be installed in the owner's bedroom. This is a safeguard against burglarizing.
8. Convenience outlets so placed that no point along the floor line on any usable wall space, unbroken by a doorway, is more than six feet from an outlet.
9. A convenience outlet in each usable wall space three feet or more in length at floor line.
10. A convenience outlet flush in top of mantel shelf or adjacent to mantel.
11. A convenience outlet for portable appliances in dining area, kitchen, laundry, workroom, garage, and porch at the place most desired for its use.
12. Special outlets-for ranges, ventilating fans, doorbells, master switch, and outdoor lighting.

The height of wall switches and convenience outlets is important for convenient use and saving of wall space for other purposes. Recommendations follow:

1. Wall switches should be on lock side of door, within six inches of the frame, and from 48 to 54 inches above the floor.
2. Convenience outlets should be located within reach, either 12 to 18 inches above the floor or just above the baseboard. In kitchen, dinette, laundry, bathroom, utility room, and garage the outlets should be about 48 inches above the finished floor. In rooms where a vacuum cleaner is to be used it is possible that a single convenience outlet might be incorporated with the switch to the lights.

The number, kind, and location of outlets determine the path which the pairs of wires or conductors must take to supply the outlets with electrical power. Licensed electricians will plan this path which they call a circuit. (An electrical circuit consists of two or more conductors making a continuous path for the current to travel from the source of supply to the point where it is used, and return.) Each circuit has the carrying capacity of a certain number of amperes. According to the voltage of the power supplied, this also means that only a certain number of watts can be used on that circuit.



The size of wire used for the circuits is important, first, because each size will carry a certain current intensity without overheating, and second, because as an electric current passes through the wires of the circuit, friction or resistance tends to reduce the pressure or voltage. The larger the wire the less is the loss or *drop*. It is also true that the longer the wire the greater the loss. The size of the wire should be such as to provide amply for the current consumption resulting from the simultaneous use of several lamps or appliances. Serious inconvenience may be caused by drops in the voltage due to a demand for current in excess of the carrying capacity of the wire. In other words, the size of wires used in the circuits should be related to the size or amperage of current the use on the circuit necessitates.

The sizes of wire are designated by gauge numbers. These are marked 000, 00, 0, 1, 2, 3, etc.; as the numerical value increases, the size of the wire decreases.[1] The gauges most frequently used in the home for lighting and appliance circuits, are numbers 14, 12, and 10, and for power circuits, number 6. Flexible cords for portable lamps use numbers 16 and 18, and small heat appliances number 14. Because larger appliances are being introduced, it is recommended that new homes be wired with number 12 wire or even number 10.

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[1] These numbers are usually designated in trade as No. 14 A.W.G. The "A.W.G." is abbreviated from "American Wire Gage."

Each gauge of wire will safely carry only a given number of amperes without overheating and hence should be safeguarded by connecting no devices or combination of devices on the branch circuit that will use in excess of that amperage. By tracing branch circuits throughout a house, it should be possible to determine how many appliances may safely be carried on each circuit.

BRANCH CIRCUIT, GAUGES OF WIRE, MAXIMUM SIZE FUSE AND WATTAGE POSSIBLE FOR EACH [1]

	Gauge of Wire	Fuse Size	Wattages
Ordinary lighting and appliance	14	15	1650-1875
Medium duty, lighting and appliance	12	20	2200-2500
Heavy duty, lighting and appliance	10	25	2750-3010
Heavy duty, range and power	6	50	220-250 11,000—12,500
Extra heavy duty, range and power	4	70	15,400—17,500

Three types of circuits may be required for a house: the general purpose circuit, the appliance circuit, and the individual equipment circuit.

The *general purpose circuits* are used to serve lighting outlets and some convenience outlets in areas other than those served by appliance circuits. The size of wire recommended is No. 12. This has a capacity of 15 amperes and allows for a slight overload without damaging or overheating the wire. Number 14 wire was formerly used but it is too light for any except short runs of 30 feet or less. No fixed appliances with a rating more than six amperes nor a single portable appliance with a rating of more than 10 amperes should be planned for use on this type of circuit.

The *appliance circuits* serve all convenience outlets in kitchen, laundry, dining area, utility room, and garage. This circuit has a power capacity of 20 amperes. Usually the rooms served are grouped closely requiring a run of not more than 45 feet. When this is the case, No. 12 wire is adequate but longer runs may require heavier wire. The circuit is to be used for portable electrical appliances, as the fixed appliances used in these rooms requiring a heavy load of power have their own circuits. No single appliance with a rating of more than 15 amperes should be planned for this circuit, as other loads may be connected to the circuit at the same time.

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[1] Adapted from Farm Home Electrifications, Part VI, *Simple Household Electrical Repairs*, p. 13, prepared by a committee from the American Home Economics Association, Miss M. Attie Souder, chairman. Issued by Committee on the Relation of Electricity to Agriculture, 1120 Garland Building, Chicago, Ill.

The *individual equipment circuit* serves a single appliance or group of similar appliances. The appliances served are usually fixed and take heavy toll in power and usually require a special voltage. The electric range, because of the high wattage used, requires a three-wire circuit and operates on a nominal 115/230 or nominal 120/208 volts. The wire for this circuit is heavy, No. 6 or heavier being the requirement.

The number of each of these types of circuits is determined by the number and wattage of electrical appliances which are desired for use in the house. In no case should the wattage used on any circuit amount to more than the conductors are rated to carry. In fact, each circuit should be protected by a disconnecting device mentioned earlier which operates when the circuit is overloaded. If a sufficient number of circuits is provided the likelihood of overloading any one circuit is reduced, and the voltage drop for all is less.

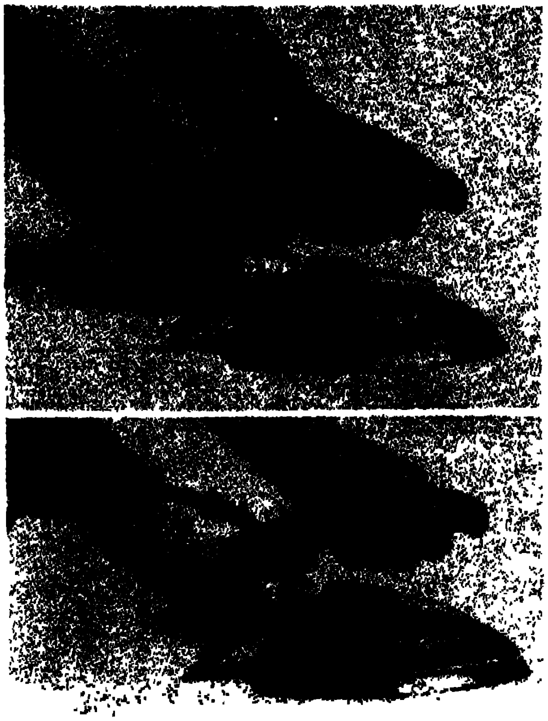
Circuit protective devices are of two kinds: a circuit breaker and fuses. *A circuit breaker* is a mechanical device, which when a current greater than that for which the circuit breaker is set passes through, a magnetic force produced in an electro-magnet causes the contact points to separate and thus open the circuit. When this happens, the breaker is said to be "off" because a switch has been moved to that position. After the cause of the excessive current is eliminated the breaker is re-set by moving the switch to the "on" position. Thus each circuit is protected against overload.

The *fuse* is an older protective device. There are two fuses for each circuit, one for each conductor. They are located in a fuse box usually near the meter. Each fuse contains in its case a link strip of metal alloy which has a definite current carrying capacity and which is melted or fused when a current in excess of the predetermined amount is forced through it. Its melting opens the circuit and thus prevents the excessive current from continuing to flow through the house wiring. Fuses are of two types, plug and cartridge. Either type is used on 110- to 125-volt circuits and is rated in amperes. Higher voltage circuits require cartridge fuses rated at 0-600 amperes. In the plug fuse the alloy strip is enclosed in a porcelain, glass, or metal cup which screws into a socket. The contact tip of the screw base is of copper or aluminum and the ampere-carrying capacity is usually marked there. A mica or glass window enables a view of the metal strip. A blackened fuse window usually indicates that there has been a short circuit with a heavy or dangerous amount of current flowing. If the window remains clear, the circuit may have been only moderately overloaded, perhaps by the turning on of one too many appliances at one time.

The ordinary *plug fuse* will melt with only a momentary overload, such as the starting current of a household motor. A special fuse plug, known as a Fusetron, has a thermal cutout in addition to the fuse link. This provides a time lag which eliminates interruptions of service due to momentary overloads. It does break the circuit if a definite short circuit occurs. A fuse known as the Fustat is made to fit into a standard base fuse holder designed for a given amperage. It is locked into place by an adapter which must correspond in size. When the proper amperage is installed this prevents the substitution of a fuse with too high an amperage, or any other bridging materials as pennies.

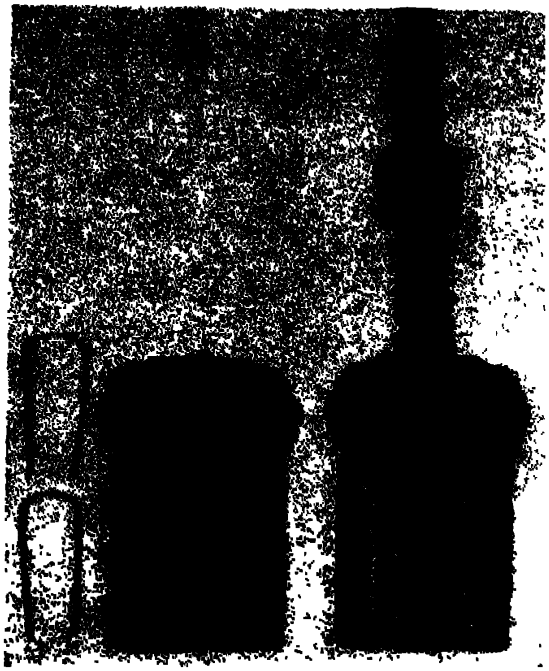
The *cartridge fuse* was used in many of the older installations. It is important to have the fuse of the proper number of amperes to correspond with the wiring of the circuits.

While changing a fuse, it is safest to shut off the electric current. This is done by pulling down to the "Off" marking the handle of the main switch, usually found on the right-hand side of the box containing the fuses. A blown fuse should never be replaced without first locating the cause of its blowing. A good check to determine if the line is still shortcircuited is to screw a light bulb into the socket of the blown fuse. If the bulb lights to full brightness the line is still shortcircuited; if it lights only to half brightness there is no short circuit.



Correct and incorrect ways of removing an appliance plug from an iron. The appliance plug should be grasped when disconnecting it from the appliance. Grasping the cord only may pull it out of the plug.

All of the portable electrical appliances must be connected to the appliance circuit through the use of an extension cord. On some appliances this cord is a permanent installation in the appliance itself. In that case an attachment plug with prongs fitting into the convenience outlet is affixed on the opposite end of the cord. On other appliances the extension cord is separate from the appliance and a special appliance plug fits into two prongs on the appliance. Because plugs are used for making and breaking connections, the insulation should be of a durable material that is a nonconductor of both heat and electricity, and of sturdy construction so designed as to facilitate ease in handling and give durability despite a high degree of potential abuse. Although rubber is used a great deal, bakelite is perhaps the most common and popular material for plugs. Other phenolic compositions are among the substances used. Most appliance plugs used on heating appliances are subjected to considerable heat and strain. A small circular identification marking on one side of the plug indicates that it has been approved by the Underwriters Laboratories. A favorable report should be given when the following important points are considered:



One type of appliance plug opened to show how the terminals are connected to the cord by means of screws. Notice how the plug has been designed to keep each set of the wires separate.

1. Are the cord and plugs securely assembled?
2. Is there a spiral cord protector at the place where the cord leaves the appliance plug, or are other provisions made for protection of the cord in bending?
3. Is there a switch? This may be desirable if the appliance does not have automatic control.

Cords are of two general types: heater cords for use on heating appliances, and flexible cords for use on fans, lamps, mixers, and others. *Heater cords* should be of excellent construction for they conduct the power to appliances which produce a considerable amount of heat, such as flatirons, toasters, waffle irons, and space heaters. These are characterized by a relatively large energy consumption. The heater cord and its connecting plugs must be capable of safely carrying the heavy current flow and of remaining in safe condition to continue to do so. A heat insulating cover of asbestos is required on a heater cord. Heating appliances usually require moving around, with attendant wear, kinking, and strain on the cords. In addition, there is the possibility of contact with a hot surface. For these reasons, the cord must be capable of being flexed a good many times, and the cover must be durable.

Flexible cords conduct the power to lamps and appliances using motors, such as fans, kitchen beaters and mixers, electric razors, washing machines, or radios. Usually the power used by these appliances is low. The wire can be of a different

Courtesy Committee on the Relation of Electricity to Agriculture

Correct way to break a service connection.

character than for heater cords. The cover should be durable for the purpose required.

A safe, serviceable cord has suitable size wire, adequate insulating material, and a strong protective coating. The conductor of a good heater cord will be not smaller than No. 16. Occasionally, electric heaters, small grinders, and household mixers may be equipped with the larger No. 14. To give flexibility and durability, the cord may be composed of as many as 105 strands of fine wire. Wires contained in flexible cords are as small as No. 18. The cotton-wound conductors are enclosed in a rubber jacket which may or may not be further covered with cotton or rayon. Heater cords have the added protection of a filler of asbestos which provides heat-resistant noncombustible insulation. The endurance and life of any cord depends further upon the material of its covering, for which cotton, silk, rayon, or rubber are used. Cotton braid is usually more costly in the first place but far more durable than either silk or rayon. Many flexible cords and some heater cords used in damp places or under hard friction usage have a special rubber sheath or covering over the conductors or wires.

Although inferior and substandard cords are still on the market, there should be little difficulty in selecting a good cord for any lamp or appliance. Safety and performance requirements for every type of cord, based upon the service to which the cord will be subjected, have been established in the

National Electrical Code. Minimum standards or requirements for several types of cords recognized by the National Electrical Code have also been set up by the Underwriters' Laboratories in co-operation with the manufacturers.

Cords tested for manufacturers who have the service of the Underwriters' Laboratories bear a small bracelet-like label at intervals of five feet. Heater cords disintegrate first because constant flexing breaks the fine wires that make up their core. They are tested for the number of times they can be flexed, rated by the complete cycle of flexing. Each cord has a different color or label.

Heater Cords

Blue heater cords are for use on heating appliances in which the cord is not subjected to much bending. Their use has practically been discontinued. They are designated as "1000-cycle cord."

Red heater cords are for use on heating appliances in which the cord must be flexed frequently. They are designated as "3000-cycle cords."

Gilt heater cords are designed to give extremely severe use. They are designated as "10,000-cycle cords."

Flexible Cord

Yellow cords are ordinary flexible cords for use on small motors, lamps, or other appliances requiring a light electric load and little flexing.

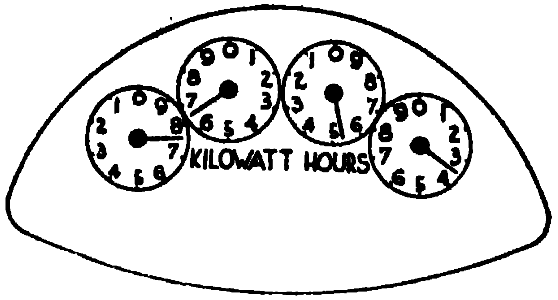
In the care and use of cords and plugs it is well to observe the following precautions:

1. Cords or plugs should never be handled with wet hands.
2. Cords designed for dry conditions should never be used in oily, damp, or wet locations.
3. When connecting or disconnecting a plug, always grasp the plug.
4. Cords should be kept in convenient places and they should be hung as straight as possible.
5. Make connections to a convenience outlet if at all possible. In that case it is best to make the connection and the disconnection at the convenience outlet, not at the appliance.

Before using any electrical appliance in a housing wiring system it is important to know that it is designed for the type of current used there. A generator or dynamo supplies the pressure or voltage which forces the current along through the entire length of the conductor, which also provides for its return to the generator. The unit of pressure is the volt. The amount of the voltage depends upon the generator or dynamo. Power companies usually deliver electric current to homes at 110 to 115 volts. Occasionally the pressure may be as much as 220 to 250 volts. A private home plant usually generates a pressure of 32 volts, but sometimes the pressure may be 110 volts. A given appliance can be used satisfactorily only on the voltage for which it is designed. That is, an appliance designed for a voltage of 110 used on a voltage of 220 would be forced to operate at twice the rate for which it was designed, and would soon be worn out. An appliance designed for a voltage of 220 used on a voltage of 110 would operate at only half its rate and so would be ineffective. This precaution must be observed in the use of *all* appliances.

Anyone using an electrical appliance as a radio, a motor, or one which has an automatic temperature control should note the type of current and the number of cycles indicated on the name plate. An electric current is said to be direct or alternating depending upon the direction in which it flows over the circuit. The *direct current* (abbreviated D.C.) is thought of as flowing in one direction only and is commonly generated by small plants such as those found on a farm. Parts of some large cities are on D.C. The *alternating current* (abbreviated A.C.) makes rapid alternation in the direction of its flow. Two alternations, first in one direction and then in the opposite direction, are called a cycle. Alternating current is almost exclusively supplied by public utilities. The cycles are rated according to the number per second. For example, 60 cycles per second are 3600 cycles or 7200 alternations. A radio is designed to be used on one or the other type of current. When another type of current must be used an adaptor will make this possible.

A motor is designed to operate on the one, the other, or



Face of an electric meter.

either type. When it operates on either type it is called universal motor. Motors are also rated according to the number of horsepower, abbreviated H.P., and this information may also be included on the name plate of the appliance. One horsepower is equivalent to 746 watts of electrical energy, but it should be remembered that most small household motors are approximately 50 per cent efficient and hence require twice the current indicated by the horsepower rating. Common household appliances that are motor driven include washing machines, ironers, vacuum cleaners, and mixers. The motion-producing apparatus of a motor is enclosed in a housing, and the motion is transmitted directly or by means of gears to the mechanism of the appliance. The gears are packed in grease and they should be warmed somewhat before being used in order to soften the grease. Sparking on a motor may be caused by worn carbon brushes, by an irregular surface on the commutator bars, or by both. When this happens, the carbon brushes should be replaced with new ones, and the surface of the commutator smoothed. Motors should always be completely protected from water.

The mechanisms of automatic heat-regulating devices are usually designed for use with either A.C. or D.C. systems. When used with the opposite type of current the mechanism may be destroyed or it may not operate at all. In a few cases the automatic heat-regulating device will operate on either type of current but this must be determined before connecting with the wiring system. The plate on the appliance should indicate the type of current for which it is to be used. Particular attention should be given in this regard to the selection of a travel iron, the use of which may be desired in towns and cities of either A.C. or D.C. systems.

Another important part of the wiring system is the meter which the electric company places at the point of entrance of the company's lines to the residence. From the readings of this instrument the charge for service is computed. The meter has four dials representing from right to left a measurement of 10, 100, 1000, and 10,000 kilowatt hours respectively.

Begin to read the right hand dial first and in case the dial is between two numbers the lesser number should be read. The reading of the above meter is

10's dial	3	KWH
100's dial	50	"
1,000's dial	600	"
10,000's dial	7000	"
Total	7653	KWH

The meter record is cumulative; that is, it continues registering the power used month after month without going back to zero. The number of KWH used during any given month is found by subtracting the reading in KWH on the meter at the beginning of the month from that at the end. The difference is the amount used. If the above meter at the end of the second month records a reading of 7758, the bill would read thus:

Present reading	7758
Previous reading	7653
KWH used	105

The rate schedule in force in any given community seems to bear little relation to the cost of the production of the current. There are wide differences from community to community depending upon the competition, the terms of the local franchise, and numerous other factors, quite as much as upon the region and the availability of electrical power. It may be interesting to compute the bill for the 105 KWH previously referred to at several of the rate schedules in present-day use. Such computations follow:

1. The one-rate schedule is used in figuring bills in which the same amount is charged for all the KWH of electrical energy consumed at a given rate per KWH.

105 KWH @ $.10 = $10.50, total monthly bill

2. The minimum charge schedule states a minimum charge for a definite amount of energy whether the energy is used or not. A common minimum charge might be $2.00 and the rate per KWH be $.05. In this case 40 KWH of electrical energy could be used for the $2.00 and any less than 40 KWH would still be $2.00. If the total KWH consumed is greater than the minimum charge a uniform unit rate or a lower rate may prevail.

   Bill with all KWH at $.05:

   105 KWH @ $.05 = $5.25 or $3.25 more than the minimum.

   Bill with all over the 40 KWH at $.03 per KWH:

   40 KWH @ $.05 = $2.00
   65 KWH @ .03 = 1.95
   $3.95 total monthly bill.

3. When the step or sliding scale schedule is used, electrical energy is paid for on a graduated scale, as:

The first 10 KWH or part thereof @	$.10
The next 20 KWH or part thereof @	.06
The next 50 KWH or part thereof @	.03
All above 80 KWH @	.02

   Bill for 105 KWH:

   10 KWH @ $.10 = $1.00
   20 KWH @ .06 = 1.20
   50 KWH @ .03 = 1.50
   25 KWH @ .02 = .50
   $4.20 total monthly bill.

4. A schedule called a fixed charge requires that the patron pay for the "fixed cost" of the equipment and material necessary to extend the service to the customer and *does not* include any charge for energy. It is often called a service charge and is sometimes based upon the size of the transformer used. The energy rate in these cases is usually much less than in other types of rates.
5. Sometimes a combination schedule is used. In this case two meters are used, one for light, and the other for heat and power.

Different rates are charged for each type of service; a higher rate for lighting and a lower one for heat and power.

6. Sometimes rates are charged on the basis of the number of rooms served. For example a schedule for residential lighting might be similar to the following:
   $0.60—each month for the 1st 5 rooms or less
   $0.10—each month for each room in excess of 5 rooms; or
   $0.04—per KWH for 1st 5 KWH used per month per room
   $0.035—per KWH for all additional energy used per month.

Suggested Activities

1. The location of outlets must satisfy the original scheme of interior decoration and furniture arrangement. It should be flexible so that future rearrangements of furniture can be equally well served electrically. Outlets must be located conveniently to serve the desired lighting and portable appliances. Recommended heights and locations of switch and convenience outlets are:
   Wall switches—
   Convenience outlets—
   Telephone outlets—
2. The master switch controlled from the owner's bedroom is a safety device used by some people. If you had one, what outlets would you want it to control?
3. Using accepted graphical electrical symbols, locate switches, outlets, circuit breakers, fuse boxes, and meters in an accepted house plan.
4. Indicate on the form on page 532 the minimum outlet requirements for each of the rooms in the house.
5. There are several types of circuits required in distributing electrical energy throughout the home. These include:
   1. General purpose circuits—15 amperes.
   2. Appliance circuits—20 amperes.
   3. Individual equipment circuits—these are two- or three-wire and operate on nominal 115/230 or nominal 120/208 volts.

   Plan the circuits for the house incorporating the points shown in the table on page 532.
6. Where should the meter box be placed? How many fuses should there be? What size should they be?
7. If there were circuit breakers where should they be placed?

	LIGHTING OUTLETS	SWITCH CONTROLS	DUPLEX CONVENIENCE OUTLETS	OTHER TYPE OF SERVICE OUTLETS
Living room				
Dining room				
Dinette				
Kitchen				
Laundry				
Bedrooms				
Bath				
Recreation room . . .				
Utility room				
Front entrance				
Entrance hall				
Hall				
Stairway				
Porch or terrace				
Attic				
Garage				

TYPE OF CIRCUIT	NUMBER OF CIRCUITS	EQUIPMENT USED ON THE CIRCUIT	ROOMS SERVED	SIZE OF WIRING USED	NO. OF AMPERES
General purpose circuits		(a) Lighting			
		(b) Small portable appliances			
Appliance circuits					
Individual equipment circuit					

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UNIT SIX

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Choosing Equipment Which Uses Electricity and Gas

ANY one of a variety of reasons may lead to the necessity of choosing new equipment. It may be that a new home is being established and all the numerous items for its furnishing and equipment are to be chosen. It may be that a piece of equipment now owned is to be replaced because it is worn out, obsolete or less effective than newer models more recently placed on the market. It may be that changed conditions necessitate the use of equipment not previously possessed. Whatever the reason that points to its purchase, new equipment should not be purchased until a careful analysis has been made of its efficiency for the work that is to be done, its suitability for use by the individual worker who commonly assumes the given task, and its purchase price in relation to available funds.

When such analysis has been made the prospective buyer should have a clear idea of what is desired and what price limits must be observed. Then an investigation of possible places of purchase for the equipment is in order. A local dealer who studies his patrons' needs and recognizes his responsibility as a buyer for the community merits confidence and patronage. Mail-order houses that support testing laboratories and sell by specification generally have a high standard selling policy. If the purchase must be made from a house-to-house canvasser, one should determine the reputation and financial standing of the organization that the agent represents as well as the trustworthiness of the canvasser himself. If cash is not available for complete payment of the purchase price, a contract agreement for payment of the remainder is often possible. This contract is usually a mortgage and its terms should be thoroughly understood.

Although judgments of quality in equipment cannot be made entirely on the basis of a manufacturing label, still, choice of a piece made by a reliable manufacturer of long standing insures recourse if the equipment fails. Hence, it is essential that the manufacturer's name be on each appliance. Many manufacturers use research and experimental laboratories where their products undergo critical checking. Even then an appliance may fail when used under home conditions. A short-time guarantee made by many manufacturers is given not only to satisfy the purchaser if the appliance is unsatisfactory but also to test how effectively the article is performing under service. The financial standing of the manufacturer is important as it is an index of his ability to stay in business and continue making the equipment, thus insuring availability of repairs. A manufacturing concern that labels or tags its merchandise according to performance, quality, and for safety specifications, and then sells by these specifications, renders a service to the consumer and at the same time safeguards its own interests.

When possible choices in equipment have been determined each piece should be judged from the standpoint of its construction, its efficiency, and the care required to keep it in order. The amount of time and effort required for operating the machine should also be checked. It should be made of suitable material, of good design and of proper size and shape. Efficient operation is important.

The amount to be invested in appliances and equipment is dependent upon several factors: the amount of use they will have; the kind of use they will have; the quality of material desired; the personal taste of the user; and the funds available for them. In this connection it should be noted that many of the larger pieces of household equipment are sold for prices covering a wide range. The highest price is demanded for the deluxe model which has the latest improvements in design, automatic controls, storage facilities, and other items contributing to convenience. The lowest prices are paid for what is known in trade as "stripped down" models. These models have the essential parts for efficient operation; for instance, the motor may be the same quality as that used for the deluxe model. The body, on the other hand, may be that presented in an earlier year, substantial but not revised in any detail. The medium prices are paid for models having some new feature or improvements but not approaching the deluxe model. The choice then, should first be made between the highest and lowest prices. If the money available for purchase is nearer the lowest price than the highest price, the medium priced models should be judged as to the value of the improvements made as compared to the lowest priced model. If minor improvements add greatly to the selling price, the lowest priced model will probably give the best returns for the money. Needs should be carefully studied and equipment supplied on these bases. Any more than is needed either in quantity or quality takes up valuable storage space, involves a useless expenditure of money, and adds to the care that equipment requires.

Appliances that require electricity or gas for their operation may present hazards to safety, and their efficient operation may be considerably reduced if there is not understanding by the user of the principles and laws governing their action.

Problem 1. WHAT STANDARDS OF CONSTRUCTION AND USE ARE DESIRABLE FOR PORTABLE ELECTRICAL COOKING APPLIANCES?

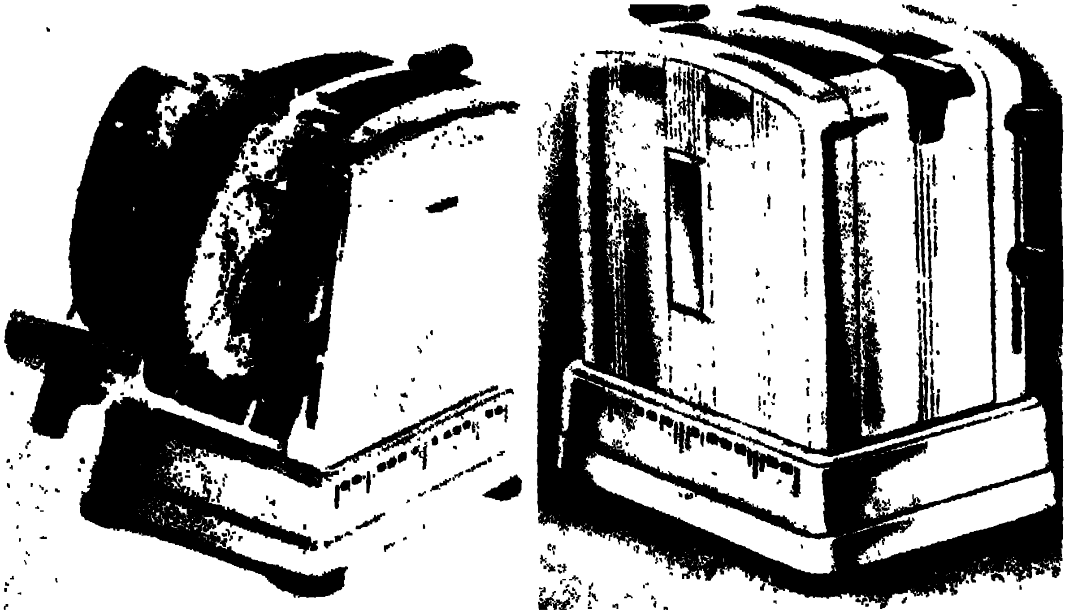
Many different portable appliances are available which perfect cooking processes, reduce the time and energy required, or increase the pleasure of the process. The choice of any appliance should be made on the basis of the purpose for which it is needed. For instance, a toaster may be desired for use at the table by a small family whose funds are limited. In that case the least costly efficient model which seems strong enough to withstand the use may be chosen. Its claim for beauty may be slight. If there are young people in the family who might entertain with snacks then more attention might be given to appearance and more money allocated for its purchase.

Once the appliance is chosen, the manufacturer's directions for operation and care should be studied before it is used for the first time. These directions should be kept in a convenient place for quick reference. Some general rules apply to the use and care of electrical appliances:

1. The appliance should be designed to operate on the type of current (A. C. or D. C.) which is in the house where it is to be used.
2. The appliance should be oiled according to the manufacturer's directions.
3. No part of an appliance having a heating element or a motor should ever be placed in water.
4. Repairs should be made as soon as necessary.

Toast may be made under the broiler or in the oven of the range, but the use of a toaster enables the serving of toast at the table while it is fresh and hot. The use of a toaster may also add interest to a menu for an informal gathering of young or old.

A toaster functions by holding bread near heating elements until the outside is browned and made crisp. If this is accomplished quickly the inner part of fresh bread is moist and soft,



Courtesy Landers, Frary & Clark

One type of oven toaster.

making an interesting contrast. The heating elements should produce toast of this quality after a preheating period of one minute. Heating units in toasters are commonly of two kinds: helically wound coils, and flat metal ribbon on mica sheets. Both coils and ribbon are wound more closely together toward the bottom of the unit, since the vertical racks slant outward slightly at the bottom to give the toaster balance, and the lower half of the slice of bread is, therefore, farther away from the element. Occasionally, coil elements sag toward the bottom after long use, thus producing an uneven temperature that is too hot in parts.

Most toasters hold two slices of bread and are classified as: the reversible toaster, the oven toaster, and the sandwich toaster.

The *reversible toaster* has one heating element in the center. The slices are placed in approximately vertical racks on either side of the element, and when one side of the bread is toasted the slices are reversed by hand. This type of toaster tends to give fairly dry toast, as the side of the slice away from the element is drying out while the other side is toasting;

Courtesy Rural Electrification Administration

A sandwich grill should be wiped off after being used. It should not be immersed in water.

however, the dryness usually depends upon the speed with which the toasting is accomplished.

Oven-type toaster, holding one or two slices vertically, toasts the bread on both sides at the same time. There are three heating elements in the oven model, one on each side and a center unit, which toast each slice. Bread toasted on both sides at one time tends to be moist in the center and to toast quickly.

The *sandwich toaster* places the bread horizontally between two wire racks or solid metal grills, joined by flexible hinges which open sufficiently to permit sandwiches to be placed between the surfaces. The toaster with the solid metal grills may be used not only for toasting but also for cooking griddle cakes, eggs, or meat at the table. In some toasters, the metal grills are removable and reversible with waffle grids on one side. In such case the sandwich toaster is readily convertible to a waffle iron.

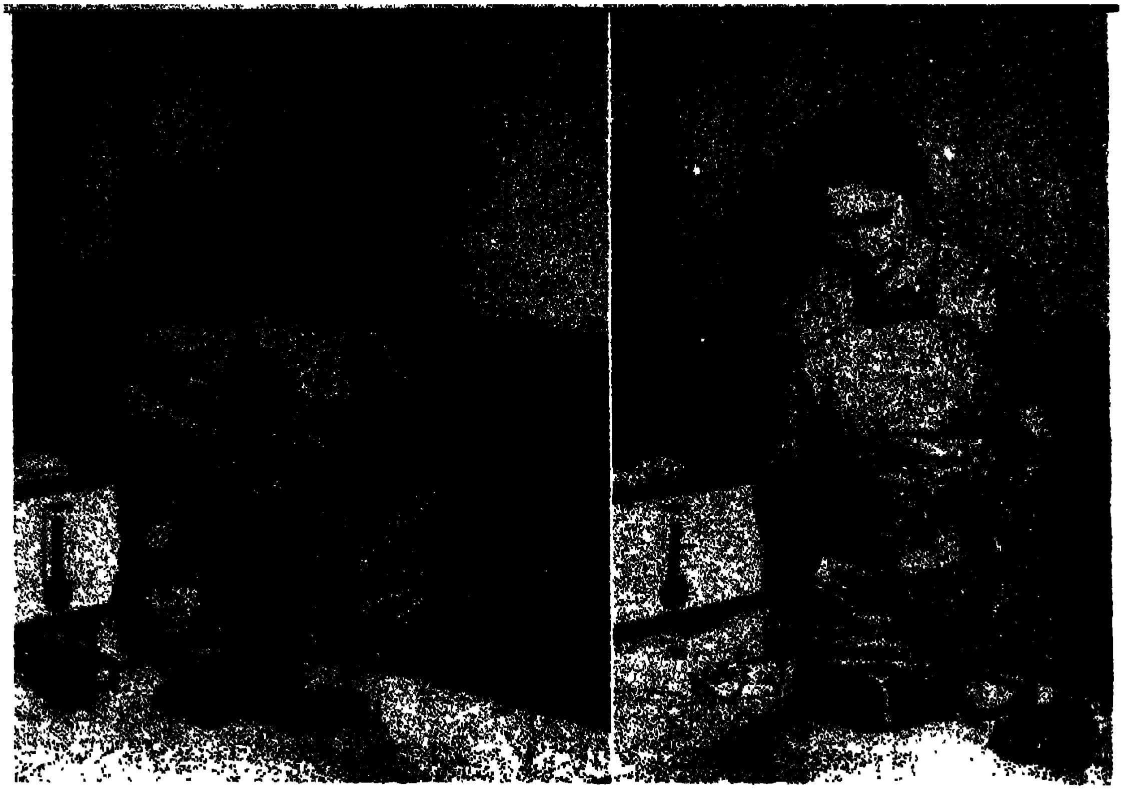
Overflow troughs or rims and a drain spout with a grease cup to hold excess fat are necessary construction features in toasters with solid metal grills.

Some toasters have an automatic device by which the degree of browning is controlled. The mechanism is governed by clockwork and when the toast reaches the desired degree of brownness, it is automatically lifted out, and the current shuts off; in others a bell rings, the bread remains in position, and the current shuts off. A toaster with automatic control prevents burned toast, but in its selection inquiry should be made to make sure that the control has been given a life-test at some recognized testing laboratory. In any automatic toaster there should be a manually operated release in case the automatic device fails to operate.

The chief cleaning which toasters require is the removal of crumbs. If crumbs are allowed to collect and come in contact with the element, they may cause a short circuit. A further difficulty is that they may become rancid and impart an undesirable flavor to the toast. Crumbs are removed with difficulty in toasters that do not have a removable or hinged bottom tray.

Toasters are usually plated with nickel or chromium. All handles should be well insulated to prevent burning the fingers in turning the toast, and the bottom of the toaster should be insulated to prevent heat damage to the table.

Waffles are used as a breakfast bread and also add interest to luncheon dishes and other informal meals. The making of waffles consists of baking a medium batter between two hot grids indented in such a way as to present considerable surface to browning and crisping. The baking grids are usually made of cast aluminum. Heat applied to the grids in baking should be evenly distributed on both sides. Expansion hinges connecting the top grid to the lower grid provide for increase in the volume of the waffle. The casing for the base grid should be constructed with an overflow trough to catch excess batter. The outer finish of waffle bakers is usually nontarnishable, easily cleaned chromium plate. The bottom of the appliance should be smooth and insulated against heat so that it



Courtesy Rural Electrification Administration

Left, the heating unit of a toaster can be cleaned with a soft brush. *Right*, a waffle iron should be brushed and wiped off after each use.

can be set on a table without danger of damage from scratching or heat. Electric waffle bakers are made in a variety of shapes, round, square, oblong, or hexagonal. Twin waffle bakers providing two waffles at one baking are also available. Some waffle bakers are equipped with means of indicating when the waffle is done, such as a light that goes off or a bell that may ring. They may also have devices to regulate the degree of brownness.

Usually, oiling the grids of the waffle baker for each waffle is unnecessary because the waffle batter is rich in fat and because the grids can be "cured" with fat. Most manufacturers pretreat the grids at the factory, but if this has not been done, or if the oils introduced by pretreating seem to have been removed, the process is simple. The grids are coated with salad oil or unsalted melted fat and heated to the smoking point. Then waffle batter is poured on, baked, and discarded. The grids are thus "cured" and require no further greasing or curing. The grids should not be washed as such treatment destroys the curing. They may be wiped with a clean dry cloth or brushed with a wire brush. The outside may be wiped with a damp cloth and then polished with a dry cloth.

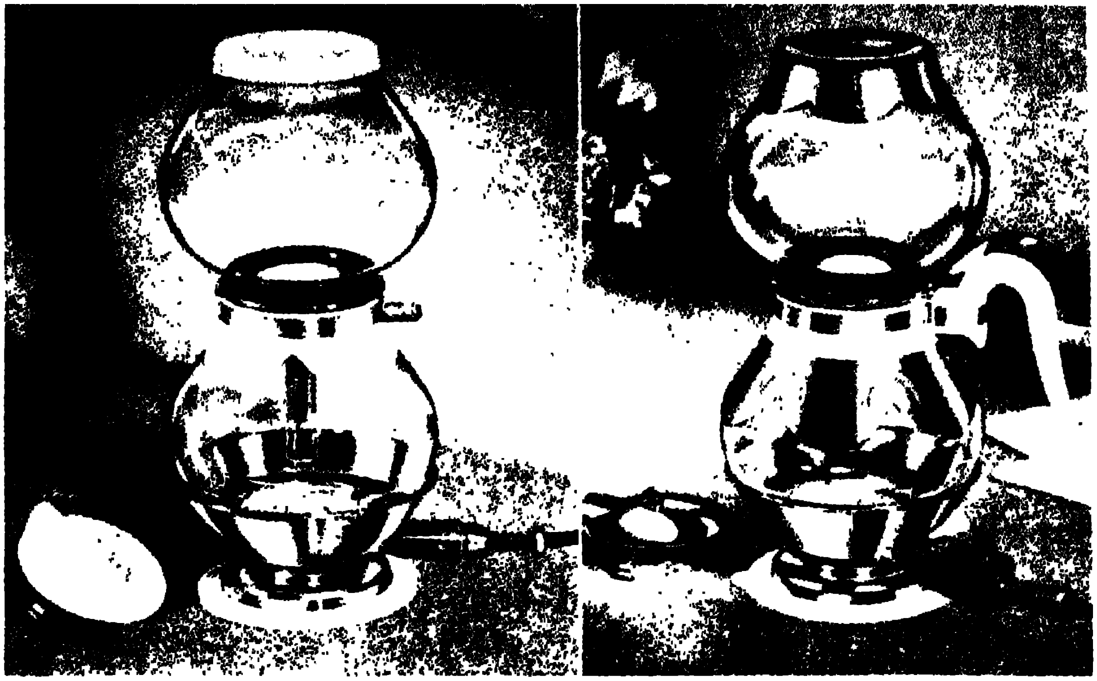
In choosing a coffee-making appliance, a consideration of the items which are essential in the making of good coffee is desirable. These items include: fresh, properly ground coffee, accurately measured; fresh water, accurately measured, the correct temperature for brewing; and a clean coffee pot, constructed of material which does not react on the flavor of the coffee.

The most important water-soluble products of the coffee bean are tannin, caffeine, caffeol, and caramelized carbohydrates. Tannin dissolves slowly in hot water and more rapidly in boiling water and the extraction of too much tannin produces bitterness. Caffeine is a mild stimulant, 80 per cent of which is dissolved into the brew in the first two minutes of its preparation. Caffeol contributes largely to the flavor of coffee. It is highly soluble in hot water, and it is exceedingly volatile. It escapes from the berry during roasting, from the pot during the brewing, and from the beverage after being prepared. It is an essential oil, becomes oxidized or stale on standing in the air, and may be observed in a coffee-making device as an oily film. Caramelized carbohydrates account for the color of the brew and contribute to its flavor.

Because tannin is readily extracted in boiling water and more caffeol is lost at high temperatures, coffee should not be boiled. Temperatures of 180° to 200° F. are commonly recommended. The pot should be kept closely covered to retain flavor.

The appliances used to make coffee in the home are a simple coffee pot, the drip coffee makers, the vacuum type coffee makers, and the valveless and valve percolator. Each of these may be heated from a range, they may come with a small electric stove, or they may be supplied with some sort of an electrical heating device as an essential part of the coffee maker. In any case the temperature should be controlled within the recommended limits.

The *coffee pot* is usually made of metal and is set on the range to receive its heat. The temperature must be controlled by regulation of the flame under the pot. It is quite possible to keep the brew under the boiling point.

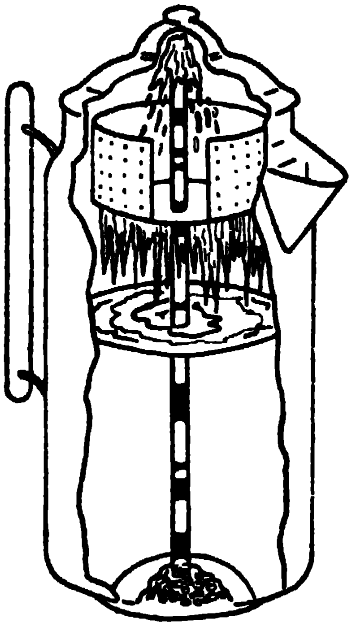


Courtesy The Silex Co.

These are vacuum-type coffee makers.

Drip coffee makers are constructed in three parts: a pot into which the brew drips; a perforated inset which holds the ground coffee; and a perforated container to hold the freshly boiling water that drips over the ground coffee, which is prevented by a fine sieve or series of sieves from going into the brew. Most drip coffee is not made electrically. Some drip pots are provided with a stand containing a heating unit upon which the pot may be placed to keep it hot. The unit is so regulated that the coffee cannot boil.

Coffee may be made in a *vacuum-type coffee maker* formed of two containers, the upper constructed with a siphon tube which extends nearly to the bottom of the lower bowl. The lower container should have a large opening to enable easy cleaning. Coffee is measured into the upper bowl and is prevented from falling into the lower bowl by a porous cloth pad, a porcelain sieve, or a glass rod. The water is placed in the lower bowl, which stands on an electric unit or on the range. When the water has been heated sufficiently, the pressure of the air and steam on the surface of the water forces it through the siphon tube into the upper bowl, leaving a partial vacuum in the lower container. When the heat is removed from the coffee maker a difference in pressure causes the water to drain back quickly through the coffee into the lower bowl. The top bowl is then lifted off, and the coffee is served from the lower container.



In a coffee percolator steam raises the water to the top of the percolator so that it can drip down through the coffee grounds.

The *percolator* is often used for making coffee. It may be heated on a stove or by an electric heating element in the pot itself. Percolators may be valveless or they may have a valve.

The valveless type of percolator has a semihemispherical chamber at the bottom of a stem. This chamber will have one or more small openings. At the top of the stem a perforated basket holds the coffee grounds. Water is placed in the percolator and fills the chamber and stem to the same height as the water on the outside of them, so that the pressure within the chamber and stem is the same as that outside. When heat is applied under the chamber, the water in the chamber heats and begins to form steam which increases the volume. When the level reaches the top of the stem it "perks" out over the coffee grounds. After this the pressure inside the stem and chamber is less than outside, so that liquid comes in through the hole in the bottom of the chamber. The process is repeated until the heat is removed. "Perking" may begin before the boiling point is reached, but the water will boil if sufficient heat is supplied, thus producing a bitter coffee.

A valve percolator has its heating element concentrated in a small area around a depression in the bottom of the pot which holds a small amount of water that heats quickly. The stem, with a valve on the lower end, fits snugly over this depression. "Perking" begins as soon as the small amount of water held therein is heated. The bulk of the water may never completely reach boiling point before the coffee is brewed.

The temperature of the coffee brew in electric percolators is most frquently regulated by connecting or disconnecting the current, but some percolators have a thermostatic control which holds the temperature comparatively constant, or a time control which automatically stops the action when percolation is complete. A protective device, either a fuse or an automatic cut-out, if provided, will shut off the current if the water boils away. Extra fuses should be kept on hand so that a burned-out fuse may be replaced without the necessity of sending the percolator away to be repaired. The automatic cut-out may be reset without the necessity of replacing the fuse.

Any coffee maker should be well balanced in design, with a sufficiently broad base to eliminate any tendency toward tipping. Handles and base must be insulated to prevent difficulty in handling or damage to the table. The spout or faucet should not drip. The lid should be secure, attached either with adequate hinge or unattached with deep flanges.

A study of coffee made in each of the types of coffee makers reveals some interesting points: [1]

> Vacuum-makers scored the highest on the beverage produced, gave the highest yield, used the shortest contact time, handled the finest grinds of coffee, and produced acceptable temperatures, but required more coffee and were considered fragile to use and handle. Percolators produced average coffee, worked best with medium and fine grinds, required less coffee, and gave the highest temperatures and low yields. Dripolators scored lowest on the product produced, took the most time, gave low yields, required higher proportions of coffee, would not handle the finer grinds, and were considered the poorest performers in coffee making.

Coffee makers may be made of metals such as aluminum, porcelain enamel, or copper plated on the inside with tin and on the outside with chromium. Vitrified china and glass flameware are used for the body of some drip coffee makers and percolators. Plastics have been used for some parts of coffee makers. The flavor of the coffee brew seems to be affected adversely if it is allowed to stand for a time, especially in copper pots.

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[1] P. B. Potter, and Amelia H. Fuller, *Coffee-Making Equipment,* p. 30. Bulletin 367, Virginia Polytechnic Institute, Virginia Agricultural Experiment Station, 1945.

Coffee makers should be kept scrupulously clean. The volatile caffeol is dissolved in an essential oil which coats the pot with a brown deposit difficult to remove. Washing the utensil with hot soapy water after each use is necessary to prevent this deposit from becoming rancid and affecting flavor of the brew. When a coffee maker has grooves and creases, boiling in soda water may help to keep them free of this deposit.

In many households the taste for baked and other products that must be beaten or stirred is so great that to prepare them an undue strain is imposed on the homemaker s time and strength. In such cases it is possible, funds permitting, to secure motor-driven beaters or mixers, a large variety of which are on the market. Large mixing machines usually are fastened to a stand and have attachments for many different operations. Small mixing machines may or may not be fastened to a stand and have only two or three attachments. The speed at which the beaters are rotated varies with the mixing machine chosen. Some machines allow for only one speed, others for high and low speeds, and still others have gradations between high and low.

The beating is done with mixers of steel blades fastened to shafts below the motor case. The blades vary somewhat in size, are round or oval in shape, are smooth or have a central ridge. The blades must not touch the bottom of the bowl but should just clear it. Some mixing machines may be operated at any one of three or more speeds.

Some mixers have several attachments which increase the utility value of the machine. These should be chosen on the basis of the use required of them by the family. They include: vegetable slicer and shredder, flour sifter, potato peeler, pea sheller, can opener, knife sharpener, food grinder, oil dropper, and ice cream freezer. An attachment much desired by families using a great deal of fruit juice is the fruit extractor. A whisk beater made of many fine wires is an attachment on some large mixers. To facilitate mixing in all parts of the bowl the beater may revolve on its own axis and at the same time rotate around the bowl; or the bowl may turn automatically.

Courtesy Good Housekeeping Institute

An electric beater in use.

Necessary care includes keeping the mixers clean and oiling the motor and moving parts according to directions. A rubber plate scraper should be used to keep mixtures from accumulating on the sides of the mixing bowl. The motor should be turned off before attempting to raise the beaters or remove the bowl.

The mixer should be kept in a convenient location if it is to be useful. Working surface space is often the best. When not in use it should be covered. A convenience outlet at that location is also important if it is to have its greatest use.

When purchasing a mixer a size should be chosen in accordance with the work expected of it. The motor should run quietly and the controls should be conveniently placed. The beater blades should be easily cleaned, and the whole machine should be easily stored.

Suggested Activities

TOASTERS

1. What types of toasters are available on the local market?
2. What characterizes the least costly models?
3. What improvements are found on the most costly models?
4. Under what circumstances do you recommend the purchase of either?
5. Make toast on a desirable model of toaster, testing out its performance in regard to even browning, timing, ease of cleaning, and other items.
6. What would it cost to use this toaster for a month if toast were made every morning for breakfast and two Sunday evenings?

WAFFLE BAKERS

1. What types of waffle bakers are available on the local market?

2. What characterizes the least costly model?
3. What improvements are found on the most costly models?
4. Under what circumstances do you recommend the purchase of either?
5. Make waffles on a chosen model of waffle baker noting its desirable points in regard to quality of waffle, time required, ease of cleaning, and other items.
6. What is the cost of using a waffle baker for a month if it is used three mornings for breakfast and a waffle supper for six twice a month?

ELECTRIC MIXER

1. What makes of electric mixers are available on the local market?
2. What characterizes the one which represents your choice? What attachments do you want for it? What is their cost?
3. Use a mixer to make a common batter or dough. What precautions must you take to get the most benefit from its use? How is it cleaned? How should it be stored?
4. What precautions must be taken in regard to its use on electric current?

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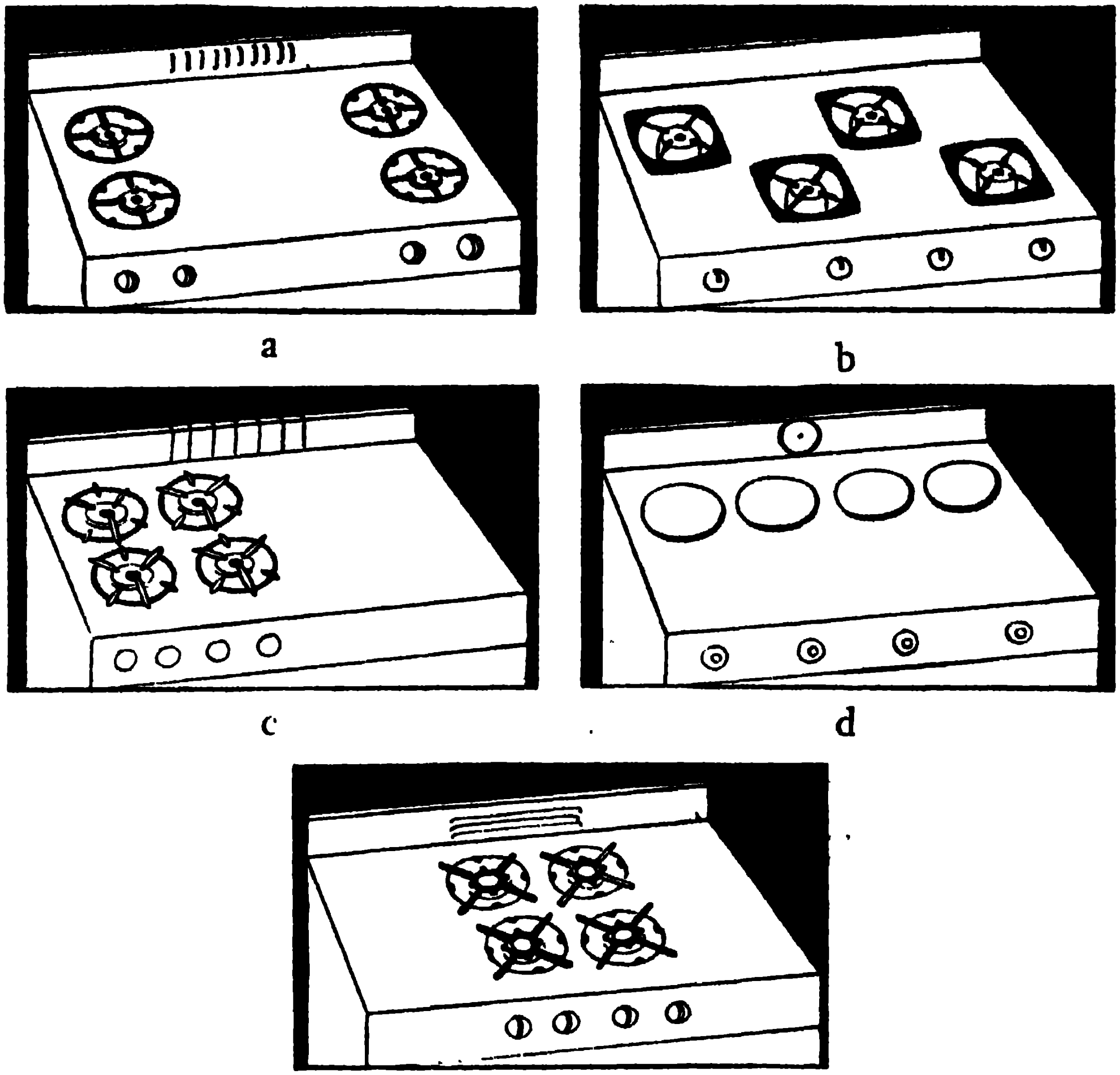
Problem 2. BY WHAT STANDARDS MAY RANGES BE CHOSEN?

Although some cooking is done on small appliances, nearly all families do most of their cooking on one of several forms of large cooking stoves or ranges. These are generally classified according to their source of heat or fuel, as electric, gas, gasoline, kerosene, and wood or coal ranges. Each range must have a heating unit and accompanying appliances definitely designed to aid in the combustion of the fuel for which it is planned. However, in many respects, good range construction is the same regardless of the fuel used. The frame should be sturdy, heat resistant, easily cleaned, and of a convenient height. Ovens should be planned to heat to good advantage and, if much used, so placed that stooping is avoided. The shelves in low ovens should pull out at a convenient height and lock so that there is no danger of tilting. Storage spaces and other conveniences included in the range should be placed to conserve space and to facilitate the work there.

Most ranges are further classified according to frame design, in which the most important item is the position of the oven. Classification and description follow:

1. *Table top* ranges have the oven below and at the right, at the left or in between the cooking surfaces. They cover floor space from three to five feet long by two feet to two feet, six inches deep.
2. *Cookers or apartment ranges* are small ranges with the oven and broiler directly below the surface burners. They cover floor space about two feet square.
3. *Console or elevated-oven* ranges have their oven elevated above the cooking surfaces on the right or left side. They cover floor space similar to the table top ranges.
4. *Hot plates* consist of heating units in a frame that supports the cooking utensils. Hot plates consist of from one to three units. Fuel to heat them may be kerosene, gasoline, gas, or electricity. Except for the gas hot plate, these are easily portable from one place to another.



Courtesy American Gas Association

The burners on range tops may be arranged: a, as a divided top with two burners on each side and a space between; *b*, with staggered burners—two burners in front and two in the back; *c*, with grouped burners—four burners at one side and space to the right or left; *d*, as a line of burners—four burners across the back; e, or as grouped burners—four burners in the center with a narrow space on each side.

Choice of the frame design of ranges will depend upon individual taste, the space available for its placement, and upon the relation which this space bears to windows, doors, and fundamental equipment. For example, if a range with an elevated oven on the right hand is set with a window adjacent to

Courtesy Standard Electric Manufacturing Corp.

Ovens should be well insulated.

the oven, the cooking surface will be screened from the light.

The frame itself may be made of cast iron, steel, or malleable cast iron. The finish may be a smooth polish on the material, as is common on coal or wood ranges. Other ranges and some coal or wood ranges are finished with porcelain enamel, the top of which is usually acid-resistant; however, any acids, such as fruit juices or vinegar should be wiped off immediately. Trims of chromium or nickel plate are often found, and sometimes the entire top is made of stainless steel or some other alloy. The present mode in stove frames demands pleasing color, stainproof and highly glazed surfaces, and seamless construction. The whole frame may be washed off when cool with warm, soapy water, followed by a rinse and drying. Removable parts of ovens should be removed and washed in the same manner. Spilled food should be removed as soon as the range has cooled. A mild abrasive may be used if necessary.

Certain desirable features should be found in ovens, regardless of the kind of fuel used or the method of distributing heat employed. These include suitable vents, rust and moisture proof linings, efficient insulation and desirable construction details. The vent should be so located on the oven top so that hot vapors will not discolor the kitchen wall by flowing directly against it. For the cooking processes in which there is little loss of vapor, as baking, the vent should be closed, but in searing and broiling the vent should be open. A lining of speckled dark-blue, porcelain enamel on steel is often chosen as rust and moisture proof. It does not chip readily under the high heat in the oven and does not show slight soil. It is important that the oven lining be made vapor tight lest moisture diffusing between the walls decrease its efficiency and

Courtesy Monarch Ranges

The oven should be filled to capacity. This is possible when oven utensils of proper size and shape are used. Note that the shelves pull out to make the pans easily accessible.

food vapors carried there produce undesirable odors. Linings are made moisture tight by stamping the entire lining out of one piece of metal, or by welding together the several pieces of metal used. Openings in the lining must be fitted with bushings to prevent leakage. If both sides of the lining are enameled, rusting is completely prevented. A desirable practice for preventing rust is to leave the oven door open for a few minutes at the beginning and at the end of the baking period.

Oven doors should be as well insulated as the walls and top of the oven and they should fit the opening snugly to minimize heat losses. They are hinged either at the bottom or at the side. Most modern ranges use a concealed latch with which the door is closed with a definite tension making a close door fit.

In many of the newer ranges the rack supports are an integral part of the side walls of the oven lining. Sliding racks designed with a locking device to prevent dropping or tipping are best if they are rust resistant and rigid enough to prevent warping or sagging.

Many ovens are insulated with such fireproof material as mineral wool, spun glass, and, in some cases, asbestos.

In selecting a range regardless of fuel used, the size of the oven should be satisfactory for the needs of the specific family. Generally speaking, an oven should be at least 14 inches high, 16 inches wide, and 19 inches deep. An oven of this size, providing the racks can be properly adjusted, will permit baking six one-pound loaves of bread at one time, or will take a roaster accommodating a medium-sized turkey. It should be possible to maintain an even temperature in the oven, even as low as 250° F., to permit satisfactory roasting of meats. Gas and electric ovens have regulators which connect and disconnect the heating unit and the fuel supply so as to maintain the temperature at which they are set. Such a thermostatic control depends upon the expansion and contraction of a bimetal strip, coil, or rod to operate an electro-magnetic or mercury switch to turn the current on or off, or to compress a spring which opens or closes a gas valve, as the case may be. Ranges using other fuels do not as yet have oven regulators but do have thermometers or indicators.

In oven cooking, as in surface cooking, the utensils used affect greatly the efficient use of the fuel. Cooking utensils used in oven cooking should be such as will absorb radiant heat readily, especially if a thick heavy crust is desired. Baking sheets should be slightly smaller than the rack and should be placed in the center to allow circulation of heat around the edges. For long, slow baking processes, a pan should be selected which does not absorb heat readily. For economical use of fuel, food should be ready to put into the oven when the desired temperature is reached. If there is an oven heat control, opening the door during the cooking period is unnecessary. A thoroughly heated oven holds heat for a comparatively long period of time. This stored heat may be utilized in baking foods which do not require an ascending temperature.

Courtesy Monarch Ranges

Good circulation of heat must be provided in ovens when eight loaves of bread are baked.

Food placed in a cold oven decreases the total time the oven is in use and some foods can be satisfactorily cooked that way.

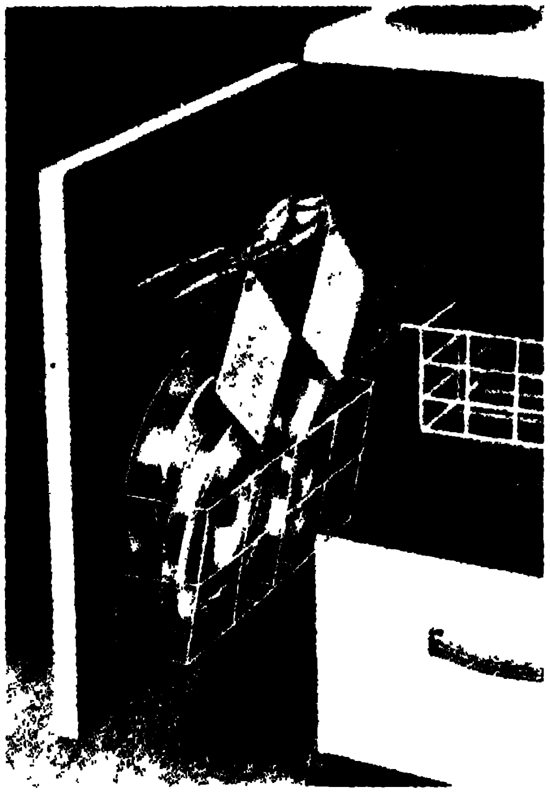
Broiling ovens have been made as convenient as possible. Usually they are located under the baking oven and use the same heating unit, but in some models there are separate broiler ovens. These make broiling possible at the same time that the oven may be used for low temperature baking. In the electric range the broiler unit is frequently the top unit of the oven. The broiler pan is usually set about three to four inches below the coils. During the broiling process the door is left ajar. Broiling racks placed on sliding shelves or drawers are a convenience if the broiler is frequently used. In either a gas or an electric broiler it is desirable for the pan to be fitted with some kind of a perforated rack so that drippings may go into the pan below, thus preventing them from spattering, scorching, or becoming difficult to wash.

At present, most ranges are built to offer as many conveniences as possible. These usually add to the cost of the stove and should be carefully evaluated in the light of their worth to the user. The following questions should be asked:

1. Could the particular function served by this convenience be as adequately provided at a lower cost?
2. Will this convenience definitely lighten the labor involved in food preparation?
3. Is the convenience a gadget that may be difficult to maintain in working condition?

Many ranges have compartments for the storage of surface- and oven-cooking utensils, for a few stirring and lifting utensils, and for some of the condiments used at the range. In some ranges a compartment located near the heating units or equipped with a heating unit may be used for temporary storage of food needed to be kept warm. Most gas, electric, and liquid-fuel burning ranges have a sliding drip tray under the burners for convenience in clearing away spilled food which may have run through. An electric light over the cooking surface is a convenience, especially if the light in the kitchen is not well planned. An electric light in the oven is an advantage if it is arranged to turn on when the oven door opens.

Various automatic devices have been developed to light or start heat. Gas ranges may have pilot lights for the surface and oven units which, when turned on automatically, light the burner. An automatic time control makes it possible to prepare food some time ahead and by setting the time and temperature controls on the oven, to have the cooking start and proceed without further attention to meal preparation until serving time. The time control consists of a clocklike device which is connected into the circuit of the electric oven or into the supply line of the gas oven. The clock is provided with movable "on" and "off" hands which make and break the connection at the designated hours. In some ranges an appliance outlet and a surface unit can also be regulated by the time control. These features of the modern range add to its "eye appeal" and to its usefulness under certain conditions only.



Courtesy *Better Homes and Gardens* magazine

Some ranges have many convenient features.

Thermal wells are convenient for surface cooking. These are insulated wells with thermostatically controlled heat and are available on either a gas or an electric range. Some of them are connected with a time device and so are thoroughly automatic. They are useful for cooking cereals, stewing meat, beans, or other long-cooking foods, or for deep-fat frying.

The ultimate decision in the choice of a range depends not only upon the conveniences offered and original cost of the stove, but also upon availability and the cost of the fuel that is to be burned in it. The table on page 557 indicates the approximate costs of the various fuels used for cooking.

Regardless of the kind of fuel or range used, certain cooking practices conserve fuel. These include the following:

1. The flames or heating units should be properly adjusted.
2. All working parts should be kept clean.
3. The use of an oven regulator if possible and an oven indicator always is recommended.
4. When possible the smaller sized burner or heating unit should be used instead of a larger one.
5. The flow of the fuel supply should be reduced after water begins to boil.
6. Pots and pans which are adapted in size and shape to the burner or the heating unit should be used.

An electric range consists of several units mounted in a frame and arranged in a manner convenient to do surface and oven cooking. Heat is produced by sending an electric current through the heating element made of materials which resist the passage of current. In electrical heating appliances, the heating element is fundamentally a resistance coil and thus provides the resistance. The early types of heating elements were made of metals that oxidized at relatively low temperatures and were either short-lived or could not be heated to as high temperatures as was desired. The development of several high-resistance alloys which will stand relatively high temperatures without oxidizing has been an important factor in the development of electric heating devices. When heated, alloys consisting of nickel and chromium, or nickel, chromium, and iron are known to produce a coating which reduces rapid deterioration of the element which is therefore longer-lived. Because they have higher resistance, shorter pieces of larger diameters will furnish the desired resistance. Thus the element is not only easier to build but is much sturdier. Common trade names are Nichrome, Chromel, and Karma. Where extreme heat is needed its use creates a rapid deteriorating action on even the nickel-chromium wire which shortens its life.

COMPARATIVE COOKING FUEL COSTS FOR AN AVERAGE FAMILY[1]

Fuel and Approximate Efficiency	Fuel Price	Heating Value in British Thermal Units	Monthly Cost Based on 300,000 BTU of Utilized Heat Month
Coal			
Pear anthracite, 10%	$9.50 ton	12,500 lb.	$1.14
Nut anthracite, in AGA range, 25%	$13.00 ton	13,000 lb.	.60
Gas			
Natural, 40%	.60 per 1,000 cu. ft.	1,100 cu. ft.	.41
Manufactured, 40%	$1.10 per 1,000 cu. ft.	540 cu. ft.	1.52
Propane (bottled), 45%	.10 lb.	21,600 lb.	3.08
Kerosene, 30%	.10 gal.	135,000 gal.	.74
Electricity, 75%	.03 KWH	3,415 KWH	3.51

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[1] *C U Buying Guide 1941*, p. 278, Consumers' Union of the United States, 17 Union Square, New York City.

Heating elements for electric ranges and hot plates should be mounted in such a way as to deliver the heat in as large quantities as possible to the desired spot, and to provide electrical insulation. Three methods of mounting heating elements for these appliances are now in common use. These include: the open coil, the tubular, and the concentric rings. When mounted they are called heating units.

The *open coil* type of heating unit was the first used. The element consists of helical coils laid in spiral grooves made in a ceramic plate. This plate is often unglazed but it is easier cleaned when it is glazed. Most units are wired with two elements. The arrangement of the two elements determines the distribution of heat when the switch is turned to high, medium, or low. The two elements connected in series give low heat, and connected in parallel they give high heat. Medium heat is obtained by connecting one element. This element may be placed in the center and gives the so called "hot spot" connection. This type ceramic plate holds heat after the current has been turned off. A modification of this type is the oven and broiler units in which open helical coils are strung across a frame designed to distribute heat readily to the desired area. Open coils are subjected to oxidation from the air and to possible injury by cleaning. Consequently they must be replaced occasionally.

The *tubular* type of mounting a heating unit has the element in the center of a tube made of a special metal alloy. The element is a small helical coil which has been wrapped with metallic magnesium. This is oxidized by heat to form magnesium oxide, which is an insulator of electricity and which holds the element in the center of the tube. The tubes are flattened somewhat to provide contact with the food container. They are bent in a spiral shape and are supported by metal brackets in a reflecting base. These units are used for surface cooking and when bent to the proper shapes are used for oven units. Because the element is closely encased it is practically indestructible, although more costly than the open coil type.

The *concentric ring* type of heating unit has the element

Courtesy Edison General Electric Appliance Co., Inc.

Reduce heat waste by using utensils that cover the heating unit.

embedded in nonconducting cement and encased in two or more flat metallic rings having a common center. Fine cement is put on the side of the metallic plate in a semiliquid form and the element in coils or flat wire is embedded in it. After pressure is applied to this material and the encasing is completed, it is baked at a temperature of from 1,400° to 1,500° F. This makes a firm mechanical support for the resistance coils, is an exellent insulator of electricity, and is a conductor of heat. Air is not present around the element, and its life is also long. The plates are mounted in a skeleton rim which protects the surface of the range from the heat of the unit. This unit, once hot, will hold heat for quite some time.

Heat from electricity is evenly distributed and the amount is easily controlled. Each surface unit may have from three to seven cooking speeds. High wattage units make it possible to heat up quickly and to cook quickly if desired. The power capacity of surface units varies from 660 to 2,200 watts. Any electric range should have on it the Underwriters' Laboratory seal for safety. The diameters of each surface unit vary with different types of construction and with the manufacturer. The diameters in most common use are six inches, six and a half inches, seven and a half inches, and eight inches. The larger units usually have the higher wattages also, and the larger cooking utensils are suitable for use on them. Certain practices are suitable to follow when cooking electrically to conserve fuel and to obtain best results with food. Water in excess of that required for a desirable product should not be used. Cooking utensils that are as large in diameter as the heating unit and not much larger are necessary. The greater the area of contact between a pan and the hot surface to which heat is conducted, the less is the cost and the heating time. Regulating the heat after the boiling temperature has been reached, and utilizing heat stored in the insulating material are also aids. Convenience outlets on the range or the range circuit for appliances such as toasters, percolators, or other devices are economical if charges for heat and power are made on a combination schedule.

Although an electric roaster is a portable appliance, with a few attachments, every type of cooking can be done on it that is done on an ordinary range. Because the roaster is portable and uses no more than 1,650 watts it can be attached to any convenience outlet. In some homes it is used as a major means of cooking and in others as an auxiliary device.

Electric roasters are rectangular or oval in shape and have a cooking capacity of from 6 to 20 quarts. The outer frame is usually made of welded steel and finished with baked enamel. The body of the roaster is insulated from one to two inches with rock or glass wool. The heat is controlled by thermostats. The lid is usually of aluminum, chromium plated brass, or a stainless metal alloy. Most lids are not insulated, as this increases the difficulty of cleaning it. Some of the lids have a heat-proof glass panel to permit checking on the progress of cooking. Most models are equipped with cooking utensils designed to fit this appliance. These may include: a large inset pan of porcelain enamel, small cooking containers of glass, porcelain enamel, china, or aluminum.

Gas is a relatively common fuel, and is sometimes, although less frequently than formerly, used for lighting purposes. Several kind of gases, each being derived from a different source and having various fuel values, are used for heating purposes. Natural gas, sometimes mixed with petroleum vapors, comes from deep wells. It may be refined and compressed before it is ready for consumption. The manufactured gases which are in general use include coal gas, carbureted water gas, liquefied petroleum gases, and others. Sometimes natural or manufactured gas is liquefied and delivered in cylinders and is then called portable gas.

Gas, like electricity, is a desirable fuel because provision for storage is unnecessary, smoke and the ash removal nuisances are eliminated, and a relatively high heating value is provided. Although it is comparatively safe to use gas, knowledge of its reactions is important if it is to be used with complete safety. Gas diffused in air is highly explosive in the presence of a flame. Incomplete combustion of gas produces carbon monoxide, the breathing of which may be fatal or only produce lassitude, headache, and nausea. The fuel itself is poisonous when breathed in sufficient quantities. For this reason, leaks from gas mains, from appliances, or any other source, as well as improperly functioning appliances, should be carefully guarded against. Appliances bearing a label from the American Gas Association have been tested for safety and efficiency. Most gas companies will inspect and adjust burners without extra charge.

The measure of the heating value of any fuel is the British thermal unit (B.t.u.) which is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit. Although the heating value of gases varies from place to place, depending upon the source, natural gas is known to run around 1,000 B.t.u. per cubic foot; ordinary manufactured gas around 500 B.t.u. per cubic foot; and bottled gas around 3,000 B.t.u. per cubic foot.

In this country gas is usually measured and sold by the cubic foot. It is measured by a meter which is read in the same manner as the meter for measuring electric current. Companies often encourage a greater use of gas by offering a sliding scale of costs for the larger quantities used, much in the same manner as is done by electric companies.

Cooking by gas is accomplished through the use of burners. Gas is forced through the burner and is ignited at the openings called ports. The combustion of gas takes place in two steps. Partial combustion of the hydrocarbons in the gas, principally carbon monoxide and hydrogen, results in an inner cone of light blue or green. The complete combustion of the carbon monoxide and hydrogen to carbon dioxide and water vapor produces an almost colorless outer cone. When lighting the burner the two cones should be allowed to develop completely before the flame impinges on any surface which would cool the gas. A good gas flame is said to be hard; a soft or wavering, floating or wandering flame is likely to be a dangerous one that gives off carbon monoxide. In general, burners with ports in the sides instead of on top are preferable because they are less easily clogged by liquids boiling over. Those constructed with an upper disk which can be unscrewed to permit easy cleaning are also desirable.

Burners are classified according to the manner in which the ports are arranged.

1. The star, eight-arm, daisy, and round burners are cast in one piece with the ports arranged on top. The use of these burners is being discontinued.
2. The die cast burners are made with part of the burner-head removable. The ports from which the gas is emitted are cast in this removable part. The flame is emitted from the side and makes the burner easy to clean.
3. The ribbon-flame burner also has a removable part, and it emits gas from a slit around the side of the burner.

Burners are made in different sizes to accommodate a variety of uses. The giant burner is built to have a heating capacity of not less than 12,000 B.t.u. per hour; the regular or standard burner has a heating capacity of not less than 9,000 B.t.u. per hour; and the simmerer has a heating capacity of not less than 1,800 B.t.u. per hour. Some models have a two-position valve which provides full or simmering heat as required, and other models have a three-position valve which converts the burner into a giant, a regular, or simmer burner. On some models there are indicators to show the point to which the valve should be turned. In other models a click indicates that a sufficient amount of gas is passing into the burner to insure ignition. Turning back slightly sets the burner for simmering; a slight forward turn brings a full flame. It is important that all burners should burn continuously even when turned low. Handles which regulate the burner should be easy to grasp. They should not turn too easily and should not be so shaped as to turn if caught in clothing. Self-locking types on all burners afford protection when there are small children in the kitchen.

The efficiency of a burner is related not only to its own construction but also to the construction of the whole cooking top. On some ranges a burner bowl may almost enclose the burner underneath it and on others the bowl leaves the space practically open. In most models the burner sits under a grate which supports the cooking utensils, and is so designed that the principal part of the flame is employed in heating the utensils, and that the flame does not impinge much upon the grate. The grate itself should be light in weight, sturdy, easy to clean, and rust-resistant. Its supports should be close enough that small pans can sit on it without tipping. Some few models, less commonly used, may have a closed or smooth cooking surface. This type resembles the top of a coal range with removable lids. In all cases, the burner flame should be as near to the bottom of the utensil as will permit complete combustion of the gas, and one or more burners should be large enough to give relatively uniform heat distribution over a large surface, as is required in a large preserving kettle or a large skillet. This is important not only from the standpoint of even cooking temperature but because the table top of the range adjacent to the burner may be damaged by heat from a utensil which extends beyond the burner. When using gas, the flame should not be allowed to lick up around the cooking utensil, because of the waste and the possibility of the production of carbon monoxide. When boiling begins, the flame should be lowered to save gas and improve cooking.

The American Gas Association has developed certain specifications for ranges in regard to efficiency and safety. Any range must meet these requirements to bear the Laboratories' Seal of Approval. In addition, ranges of certain superior qualities are granted a designation of CP or Certified Performance gas range. Specifications for this quality of range which are observable by the lay person follow:

General

Domestic gas ranges to be eligible for test under these requirements shall bear the Laboratories' Seal of Approval of the American Gas Association.

Top Burners

1. Top burners shall be of the dual-purpose type for simmering. "High-low" type burner valves are acceptable.
2. One or more top burners shall have an input rating of 12,000 B.t.u. per hour and shall have an output capacity sufficient to raise 5 lbs. of water 140° F. in not more than 9 minutes.
3. Automatic top burner ignition shall be provided for all top burners.
4. Top burner heads shall be either constructed of rust-resisting metal or shall have an enamel finish.

Ovens

1. The oven temperature shall reach 500° F. from 70° F. room temperature in 11 minutes.
2. Ovens, when empty, shall maintain a minimum temperature of 250° F.
3. The average surface temperature of oven exteriors shall not exceed 75° F. above room temperature.
4. An automatic oven burner lighter with an automatic device to prevent escape of unburned gas shall be provided for each oven.
5. An oven thermostat shall be provided for each oven.
6. Oven vents shall discharge the flue gases away from the rear wall.
7. Ball bearing rollers, or the equivalent, shall be provided on all drawers.
8. Effective stops shall be provided for all drawers and racks.

Broilers

1. The broiler temperature on combination oven and broiler ranges shall reach 600° F. above room temperature within 15 minutes.

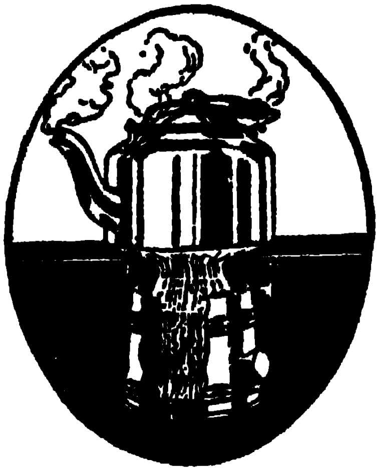
2. An effective smokeless type of broiler pan shall be provided.
3. An automatic broiler burner lighter with an automatic device to prevent escape of unburned gas shall be provided.
4. The minimum effective broiling area shall be equal to 50% of the horizontal cross-sectional area of the broiling compartment.

Optional Features

1. Automatic time clock for control of oven.
2. Interval timer.
3. Lamp.
4. Convenience electric outlet.
5. Utility compartment.
6. Plate warmer compartment.
7. Separate high broiler compartment.
8. Design to allow flush fit against rear flat wall where city ordinances permit.
9. Deep well cooker.
10. Griddle.

Gasoline as a fuel should be used with great caution, hence any appliance so heated should have the Underwriters' Laboratory label, and the operator should be well-informed as to the nature of the fuel and as to the correct use of the appliance. Burners on most gasoline ranges are somewhat similar to gas burners. Gasoline burns with a clean blue, hot flame and if a high quality of gasoline is used the burners require but a small amount of time for care and cleaning. Gasoline, although purchased in liquid form, must be vaporized before it burns. Most gasoline stoves provide for the vapor to be generated by heat before the burner is lighted. Air pressure, generated by a pump in the fuel tank, forces the gasoline through a vaporizing tube, which is heated by gasoline burning in a preheater cup beneath the tube, or in the ranges by the lighted master burner. When the master burner is used it is lighted first and is always one of the burners used, so that the heat from it continues to vaporize the gasoline for the other burners.

Kerosene is popular as a summer fuel in homes where the use of wood or coal as a fuel is considered uncomfortably warm, or where the use of gasoline, gas, and electricity is not desired or possible. Although the heat value of kerosene in terms of British thermal units is high the actual cost when used is low. Kerosene stoves usually have from two to four burners for surface cookery. The purpose of the burner is to assist in vaporizing kerosene so that it may be burned. The types of burners include the long chimney and the short chimney. The long chimney may have a double wall in which the outer wall receives heated air from outside the chimney and conducts it to the heating surface; or the top of a single-wall chimney may be decreased in size to direct the intensity of heat. The short chimney is equipped with wicks, with asbestos kindlers or lighting rings, or with wickless burners.



Courtesy Florence Stove Company

This an illustration of focused heat.

These burners have various characteristics in their operation which affect their desirability. Snyder[1] characterizes these types as follows: The long-chimney burner and the short-chimney burner with asbestos lighting ring require less time to come to a full heat than other types. The long-chimney burner requires the most kerosene, but it is quickly and easily turned out and reheated, and reaches full heat soon after lighting. On wick burners using either long or short chimneys, the flame can be lowered sufficiently to maintain simmering heat. The short chimney with asbestos lighting ring is more difficult to adjust.

She finds that "any kerosene burner, to give satisfactory service, should meet the following requirements: (a) it should be quick to develop a steady flow of heat; (b) it should perform the operations of heating rapidly; (c) it should not be extravagant in the use of fuels; (d) its provision for draft should be such that the fuel is completely oxidized to prevent

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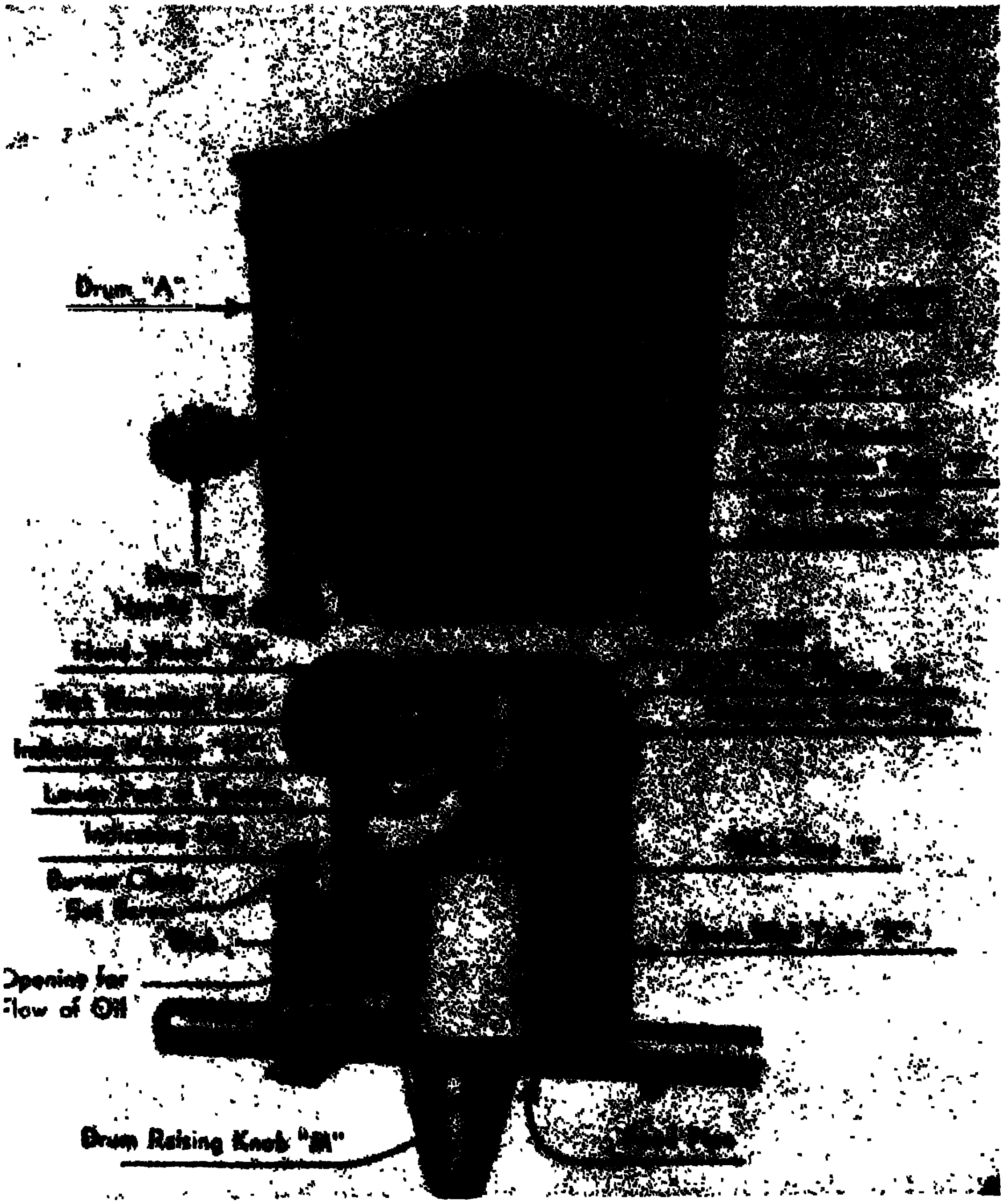
[1] Edna B. Snyder, *A Study of Kerosene Cook Stoves*, p. 5. University of Nebraska, Agricultural Experiment Station Research Bulletin 48, 1930.

Courtesy Perfection Stove Company

This is a cross section of a long chimney burner on a kerosene stove.

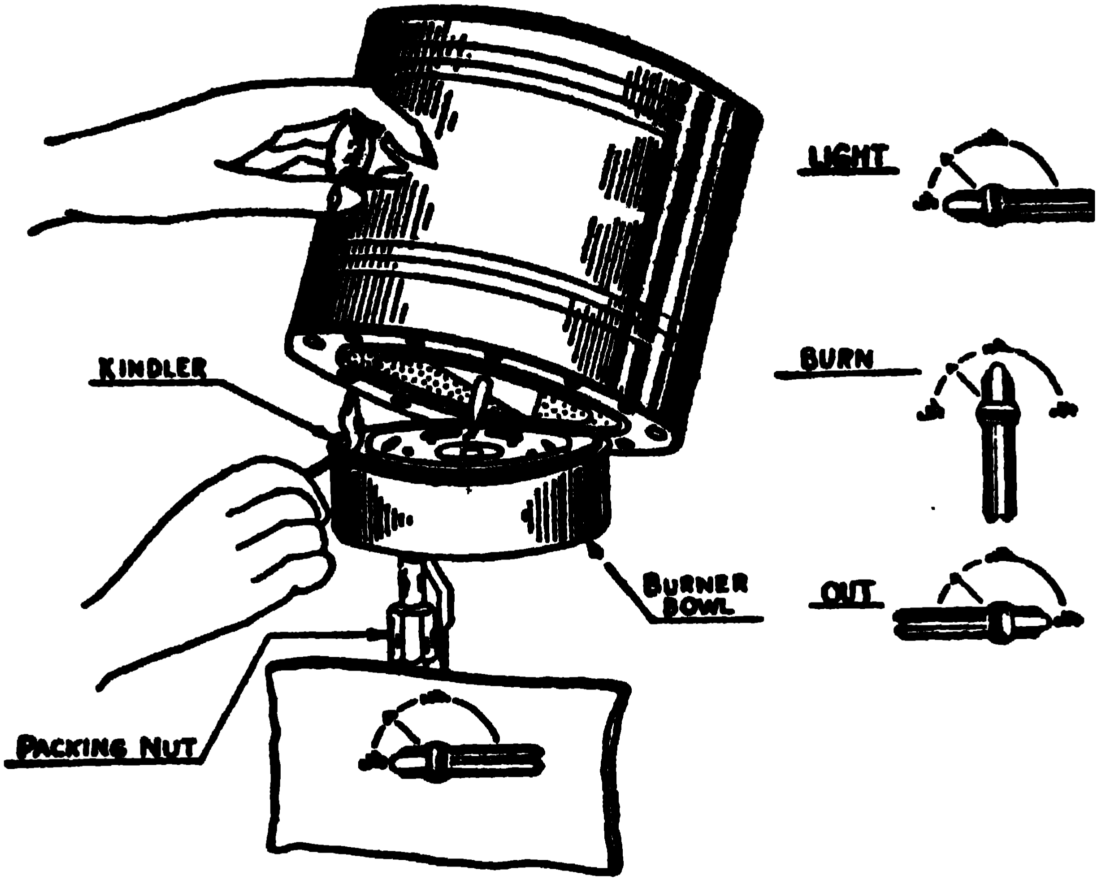
objectionable odor and the formation of soot; (e) the burner should be simple to operate and easy to clean."



Courtesy Perfection Stove Company

This is a cross section of a short chimney burner on a kerosene stove.

The secret of successful operation of a kerosene stove lies in keeping it clean and in knowing how to regulate the flame. The directions from manufacturers accompanying stoves should be read and carefully followed. All parts must fit together properly or there will be smoke and noise. The oil supply should not run out, as the wick will be wasted and an



Courtesy Florence Stove Company

To light the burner lift the chimney as shown and light the kindler in two or three places. Then replace the chimney and turn it from side to side to be sure it is properly "seated."

objectionable odor result. Drafts over the burners cause flare of the flame which results in soot.

Coal ranges are made of cast iron, steel, and malleable cast iron as base materials; however, some recent models have an additional finish of porcelain enamel. Parts of a stove made of cast iron, or cast iron and steel must be bolted together. The joints are usually filled with stove putty to make them tight, but this may crack and fall out after continuous heating, thus allowing air-leaks. When the stove is made of malleable cast iron and steel, the joints are riveted and so form a permanently tight joint.

Smoke containing unburned fuel gases from the combustion of coal in ranges is expelled through a chimney. To produce an effective draft from the fuel box to the top of the chimney, the passageway should be air-tight and should have as few turns as possible. In addition to an air-tight chimney, stove-pipe joints and lids and doors should fit tightly if efficient use of fuel is made. The fire-box should be of moderate size and should promote enough space above the fuel so that complete oxidation may result.

Suggested Activities

1. What fuels are used in your locality for supplying heat for cooking? Which are most commonly used? Which are the least costly? Which is your choice? Why?
2. Examine several ranges using different fuels. Record the following information about each: Fuel used, type of frame design, finish of the frame, is it easily cleaned, position of oven, is the oven insulated, can oven door be closed tightly, are racks nontilt, material of lining, where is broiler, is the broiler easily cleaned, where are switches for all heating units, are switches plainly marked, type of heating units, size of heating units, convenience in arrangement of heating units, is there a seal of approval, storage space included, other conveniences, undesirable qualities.
3. Although price is not the most important factor for indicating quality, one may expect to find certain characteristics representing a given price range. Indicate what is found on the local market for the lowest price and the highest for ranges using each of the following fuels: electricity, gas, gasoline, kerosene, coal, and wood.
4. State five rules for the economical use of ranges.
5. Choose one kind of range. State how it should be cared for and cleaned.

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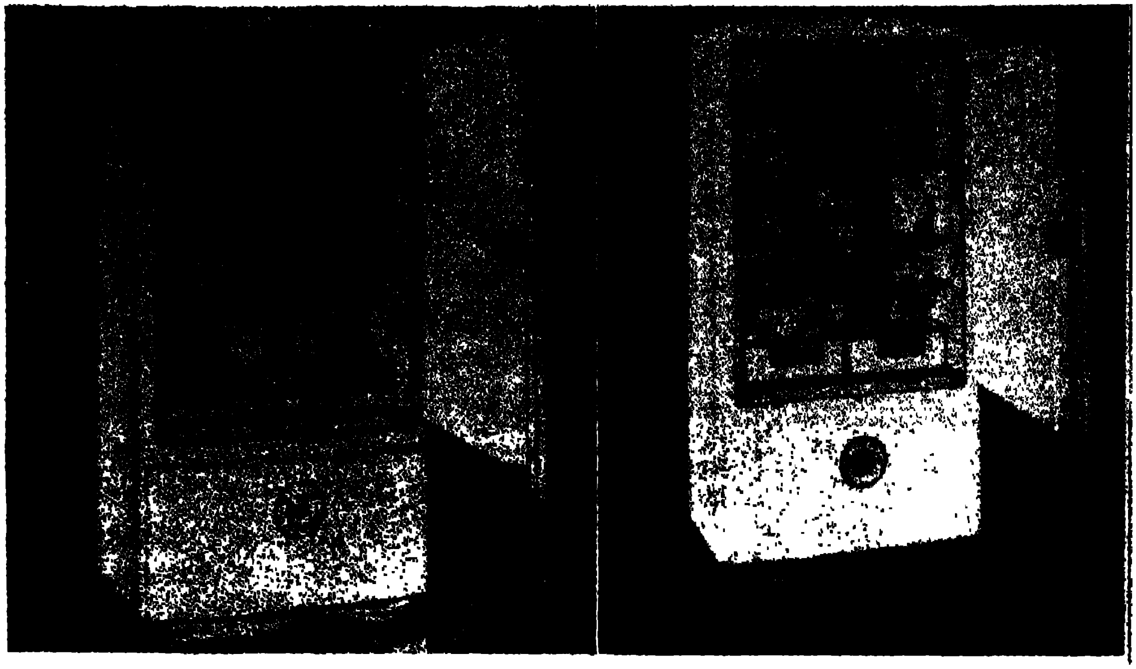
Problem 3. HOW MAY THE REFRIGERATION NEEDS OF THE HOUSEHOLD BE MET?

In the conduct of the household there is inevitably a certain group of perishable supplies that require special care to keep them in a condition safe for use. A particular hazard involved is the possibility of changes in shape, flavor, nutritive value. or safety of food for human consumption through the action of enzymes, bacteria, yeast, or mold. Such harmful changes have long been prevented through drying food, preserving sterilized food through the exclusion of air and organisms, or preserving it under such heavy concentration of salt or sugar that the growth of microorganisms is prevented. These methods of food preservation have their limitations.

Another way coming into increasing use is the lowering of temperatures below those favorable to the action of enzymes and the growth of microorganisms. This method was practiced earlier by using spring houses, lowering milk cans into a well, putting food in cool cellars or caves, or, in certain sections of the country, by having built-in cooler closets in the house. Although such provisions for coolness are helpful in keeping food in good condition, effective control of temperature is not possible, and warm, muggy days bring about food spoilage. For less than 150 years Americans have attempted more definite control of storage temperatures for food, first by use of ice as a refrigerant, and later by effecting chilling through mechanical means.

Refrigeration is defined as the removal of heat or the act of keeping cool, usually for the purpose of preservation. Heat always passes from the warmer to the cooler body, and this transfer is accomplished by one or more of three methods: by radiation, by conduction, or by convection. Convection currents are probably the most usual means of bringing about cooling in a refrigerator. The heat which enters the refrigerator from the room and with food and that is contained in the refrigerator itself flows onto the ice or onto the cooling unit of a mechanical refrigerator and is there absorbed. This brings about a cooling of the food, the air, and the walls of the refrigerator.

The temperature which a refrigerator will maintain must be such as to retard excessive bacterial growth and spoilage, to retain the freshness and palatability and the vitamin content of the stored food. Relative humidity also affects the keeping of food. An atmosphere which is not only cold but also has a comparatively high percentage of humidity is desir-



Courtesy Frigidaire Division, General Motors Corporation

Left, foods are arranged in a refrigerator having the subfreezing unit separate from the food-storage chamber. *Right*, foods are arranged in a refrigerator having the subfreezing unit in the food-storage chamber.

able for maintaining many foods in their best state of flavor, crispness, appearance, and nutritive value. It is important to recognize that when a refrigerator is cooled with a mechanical unit the moisture in the air and on foods is dried out by being frozen on the cooling unit which is always below freezing. The hydrator is devised to provide a moist atmosphere. It supplies a space in which the relative humidity may be kept high and the temperature kept low without affecting conditions in other areas of the refrigerator.

The table on pages 574 and 575 summarizes the generally accepted temperatures and known relative humidities found desirable for keeping the different groups of perishable foodstuffs at their best under home conditions. It will be noted that most foods require refrigerator temperatures for proper storage.

Foods requiring refrigeration for storage should be placed in the part of the refrigerator where the temperature and relative humidity are optimum for their perservation. Usually the coldest parts are at the side or directly underneath the refrigerating unit. Spaces lower in the cabinet are warmer. Provisions for hydrators or their equivalents differ with refrigerators.

DESIRABLE TEMPERATURES FOR HOME REFRIGERATION OF FOODSTUFFS[1]

Foodstuff	Fresh or opened Canned Food		Frozen Food	Method of Storing
	Temperature	*Relative humidity %*	*Temperature*	
Milk and milk products				
Milk	38–40			Tightly covered, clean container
Cheese, cottage	38–40	85–95		
Cheese, other	45–50	85–95		Tightly covered, clean container
Ice cream			0–15	In freezing tray or original carton
Butter	38–40			In covered dish to prevent absorption of flavors
Meat, poultry, fish,				
Lean meat	34–37	85	0–15	Uncovered, or lightly covered with wax paper, in cold part of refrigerator
Chicken	34–37	85	0–15	Uncovered or lightly covered with paper, in coldest part of refrig.
Fish	34–37	85	0–15	Covered tightly to prevent transfer of flavors
Smoked meat	45–50	low		Any cool, dry place
Cooked meat	45–50	85		Covered closely and left in as large pieces as possible
Eggs	40–45			Cover if to be kept for a long time
Fruit				
Oranges	40–45	60–75		Refrigerate only for chilling
Grapefruit	40–45	60–75		Refrigerate only for chilling
Pineapple	40–45	60–75		Closely covered to prevent transfer of flavors
Strawberries and cherries	40–45	60–75		Clean, covered, but not washed
Apples, pears	55–60			Refrigerate only for chilling Keep separate from odoriferous foods
Peaches	40–45	85–95	0–15	Cover
Bananas	55–60			*Do not refrigerate except for short periods to chill*
Grapes, plums	40–45	85–95		Cover

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[1] Westinghouse Home Economics Institute, *Electric Refrigeration and Wartime Health.* Mansfield: Westinghouse Electric and Manufacturing Co., 1942.

Foodstuff	Fresh or opened Canned Food		Frozen Food	Method of Storing
Vegetables				
Tomatoes	40–45	60–75		Covered vegetable compartment or special moisture-proof bags
Cabbage	55–60			
Green peppers	40–45	85–95		Covered vegetable compartment
Spinach	40–45	85–95	0–15	Covered vegetable compartment
Beans and peas	40–45	85–95	0–15	Covered vegetable compartment
Kale, lettuce, celery	40–45	85–95		Wash, remove excess water, place in vegetable compartment
Corn	40–45	85–95	0–15	Cover closely with paper bag, use soon
Cantaloupe	40–45	60–75		Cover closely with paper bag to prevent transfer of flavor
Potatoes and other rooty vegetables	55–60			In ventilated containers *outside* the refrigerator
Fats				
Butter	38–40			In covered dish
Lard	40–45			In covered dish
Oleomargarine	40–45			In covered dish
Hydrogenated fats	55–60			May be kept outside the refrigerator except in hot weather
Salad oils	55–60			May be kept outside the refrigerator except in hot weather
Mayonnaise	55–60			May be kept outside the refrigerator except in hot weather
Peanut butter	55–60			May be kept outside the refrigerator except in hot weather

There are certain features of the refrigerator cabinet which are important in conserving the value of the refrigerant and thus assuring low operating costs. These include the frame, the lining, the insulation, the doors, and the inside design.

The frame consists of walls, corners, and joints. Formerly, outside walls as well as the linings were made of wood, usually in thick solid pieces or of laminated construction. With the development of satisfactory plywood, there may be a return to wood for this purpose. In most of the later refrigerators, however, the frame is made of sheet metal, usually treated so as to be rust-proof. The corners of the outer shell are usually rounded and all joinings are made tight with gaskets. The outside finish may be porcelain enamel but is more commonly a baked-on enamel similar to that used on automobiles. It should be resistant to kitchen grease, smoke, and moisture, and it should not crack, peel, or chip.

The linings are usually an iron or steel base, and they are often cast in one piece. This method avoids joints and seams which tend to permit air or moisture infiltration into the insulation which also offers difficulties in cleaning. The better-designed linings have rounded corners and are made to round up at the front of the bottom of the refrigerator so that foods accidentally spilled, will not drip out. The most satisfactory interior finish for the whole lining is porcelain enamel, and the bottom lining at least should be stain-resistant.

The efficiency of the refrigerator depends in part upon the insulation which is between the outer wall and the lining. Experiments show that from 80 to 90 per cent of the heat entering a refrigerator comes through the walls and closed door, the rest of the heat coming from the cooling of food and the opening of the door. Effective insulation material is that which is a poor conductor of heat and is suited to construction purposes. This serves to separate the inside box from the warm outside air. Rock wool, spun glass, fiber boards, box boards, and others are good insulating materials and have been used extensively in mechanical refrigerators and in some ice refrigerators. Any substance used for insulation which is in granular form may become slumped down with the opening or closing of doors. A good insulating material must be moisture-resistant and odorless. Absorption of moisture by the insulation material reduces its insulating powers to a great extent. In dry climates but little moisture may accumulate in the insulation if the lining is quite tight, but in hot, humid regions, much moisture tends to collect, creating a serious problem early in the life of the refrigerator. Refrigerators of the highest quality have insulation thicker than two inches, any amount less than this being regarded as inefficient.

Insulation in the door should be as effective as that in the walls. Doors may be regarded as part of the wall and should have the same insulation as the walls. Doors are frequently built with set-back joints, which fit into set-backs in the door opening and give a tighter closing. Many steel refrigerator cabinets have wedge-shaped doors, the wedge often insulated with a composition material and the outer edge furnished with a rubber gasket to make the door fit more closely. The latches and hinges on the doors should be so constructed as to hold the door securely. Some latches do not require hand manipulation for closing, but close when the door is pushed shut with the arm or knee. Much heat enters the refrigerator by way of a loosely fitting door. If a sheet of paper can be moved readily at any point when the door is closed, the gasket does not fit tightly enough and should be replaced. The hardware should be finished in nickel, chromium, or any material which renders it rust-proof and easy to care for.

The size of the food storage space is important in the efficient use of a refrigerator. Size is usually designated in cubic feet. The capacities range from two to over twenty cubic feet, but the greatest demand is for cabinets of six to eight cubic feet in capacity, although larger sizes are also common. The size which any family should have depends upon the number in the family, the shopping habits as they affect the quantity of food which is normally stored in the refrigerator, and the kitchen space available for the refrigerator. Because the smaller refrigerators cost more in proportion to food storage capacity than the larger sizes, it is well to buy a size that will provide amply for the demands made upon the refrigerator. Overcrowding with food reduces the efficiency of the refrigerator because more food must be cooled and because there may not be room for circulation of air around it. The available shelf area, and hence the storage capacity, varies in refrigerators of the same cubic foot capacity. The shelving should be so arranged as not to waste overhead space, and yet not be so close as to make difficult the removal of objects. It would be helpful if the shelf area were stated in square feet for comparison of the available storage space.

Many refrigerators are equipped with various conveniences. These should be evaluated in terms of their contribution to the household and in terms of their cost in relation to the cash available for them, when selecting a refrigerator. Some of the conveniences found in both ice and mechanical refrigerators include lights, special baskets for eggs, storage space for foods not needing refrigeration, storage space for frozen foods, and other features. Both types may be equipped with shelves which are adjustable as to height and distance apart. In deep refrigerators shelves that slide out are a convenience. The shelves should be perforated to permit circulation of air. Usually the shelves are made of wires mounted so closely together that they make a good support. In addition, mechanical refrigerators may be equipped with special containers for vegetables, meat, and butter, special devices for removing trays and cubes, and automatic defroster. In others, there may be an especially large freezing unit and a food storage area which has controlled relative humidity.

Ice as a refrigerant has been used from the time when slaves carried it from the mountain to cool food delicacies for their masters. Now, it is manufactured or stored from the winter and used in ice refrigerators of two types, the top icer and the side icer. Ice is placed in the ice compartment and cools the air which comes in contact with it. For each pound of ice melted within a refrigerator 144 B.t.u. of heat are absorbed from the air about it. The cold air, in turn, absorbs heat from the food and walls. This cooled air, being heavier than warm air, falls to the bottom, pushing the warm air up to the ice chamber where it is cooled. Thus, a constant circulation of air is brought about. In the newer models of ice refrigerators the air does not circulate over all the ice as in the older types but simply across the bottom surface covering practically the whole of the width of the cabinet. By circulating across the bottom of the ice it is melted there and the air in the food compartment is maintained at a fairly constant temperature as long as a thin sheet of ice covers the opening into the food chamber. Thus, because the melting surface remains large, a comparatively small amount of ice will cool the refrigerator and its contents. It has been suggested that information supplied by the manufacturer supplying an ice refrigerator might include: the average temperature maintained under standard test conditions in the milk compartment and in the food compartment; the amount of ice required to maintain the temperature under standard test conditions over a 24-hour period; and a statement as to the durability of the refrigerator or the length of time during which it will maintain under normal conditions of use the temperature as given.

The ice refrigerator should be placed in as cool and as protected a position as is compatible with convenience. The accessibility of the refrigerator to the service entrance should be considered. The refrigerator should sit on a level floor. It should be attached to a permanent drain or over a large drip pan. The whole refrigerator should be cleaned frequently. The ice should never be wrapped and food should not be stored in the ice chamber.

There are two general types of mechanical refrigerating systems: the compression and the absorption type. The refrigerant in either case may be any one of a number of liquids, or a mixture of a liquid and a gas, each of which vaporizes readily with a high latent heat of vaporization. The principal difference between the two types is in the method used to manage the refrigerant. In the compression machine mechanical methods are used to compress the refrigerant so that it may vaporize and cause cooling; the absorption machine uses the physical reactions of heat and cooling to perform the same process.

The compression type of refrigerating system consists essentially of four parts: a motor driven compressor and a condenser, both of which are outside the refrigerator; the evaporator or freezer, and the thermostat inside the refrigerator. The action of this type of machine usually follows a certain pattern. Ordinarily when the machine has been running and is then shut off, some liquid refrigerant remains in the condenser under high pressure, and some in the evaporator at lower pressure. As the food chamber and the evaporator become warmer, the thermostat functions to start the motor which operates the compressor. The compressor draws the vapor from the evaporator, so that the liquid there can evaporate at low pressure and temperature, and thus effect cooling. The compressor, taking the vapor from the evaporator at low pressure, compresses it to a pressure sufficiently high to cause liquefaction in the condenser from which place heat is removed by the air. The liquid from the condenser then passes through an expansion valve or equivalent device to the evaporator, so that the operation is continuous as long as the motor runs. When the evaporator and refrigerator have cooled sufficiently, the thermostat stops the motor until warming has taken place.

The condenser is that part of the refrigerating system where the compressed refrigerant is cooled and changed from vapor into liquid. Three different types of condensers are in common use: the plate-type, the fin-type, and the fan-type condenser. The plate-type condenser is usually located at the back of the refrigerator and consists of a long coil of tubing attached to a metal plate. The fin-type condenser is usually located in front of the motor and compresser. This consists of tubing or coils to which fins have been attached or welded. The fan-type condenser is also usually located near the motor and compressor and is much the same as the fin-type condenser except that it also has a power-driven fan to speed up the cooling. Dust and dirt on the condenser are a common cause of excessive motor operation in warm weather. Every three to six months the condenser should be cleaned with a stiff brush or the dusting tool of the vacuum cleaner. For the larger plate-type condenser at the back of the cabinet, place a heavy wet cloth at the bottom of the plate and blow the dirt down from the top, using the blower attachment on the vacuum cleaner. The refrigerator should always be disconnected before removing dirt in any of these ways.

The thermostat controls the temperature in the evaporator. In most refrigerators it is placed at the point where the refrigerant is drawn off from the evaporator. It contains a tube of liquid, a bellows, and electrical contact points of silver. The liquid in the thermostat freezes or melts and thus varies the pressure on the bellows. The consequent expansion or contraction of the bellows opens or closes the contact points which causes the motor to start or stop operating. It is controlled by a switch which indicates the temperature desired by various numerals or wording. The manufacturer's directions should be studied.

The thermostat is usually set to maintain a maximum temperature of 28° F. in the evaporator and a minimum of 10° F. to 20° F. In some evaporators additional coils soldered to the bottom shelf concentrate the refrigerant in that area and produce rapid freezing without excessive cooling of the food compartment. Usually when the temperature of the compartments for staples and leftovers is set for 40° F., the temperature of the storage space for fruits and vegetables is 44° F., for meat 36° F., for milk 39° F., and for ice and frozen foods about 18° F. Setting the thermostat for colder temperatures than is needed is uneconomical. Only as many ice cubes as are needed should be made and fresh unused cubes should not be discarded. It is important to reset the temperature control promptly after quick freezing has been done, so that the temperature in the cabinet is not lowered unduly, and electric current wasted.

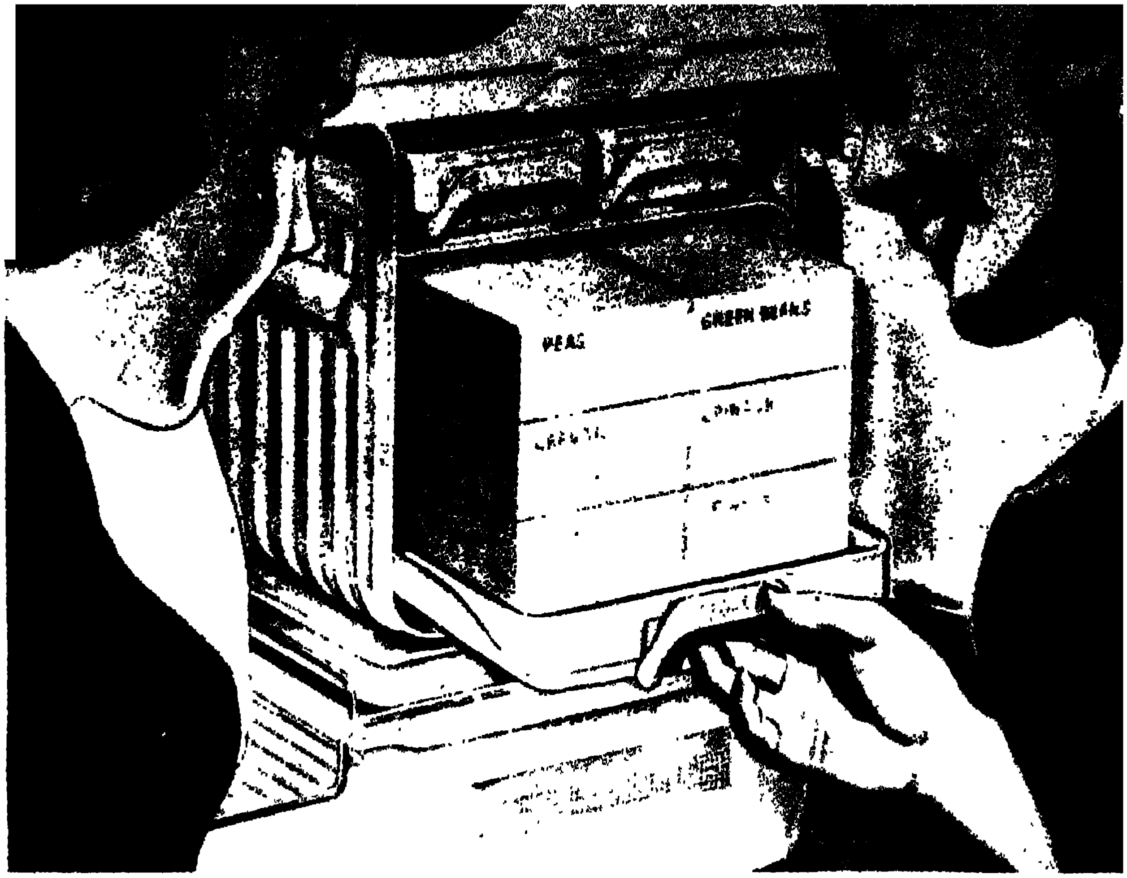
Most of the leading manufacturers of electrical household appliances make the compression type of refrigerator. Then because they have several different models of their refrigerator some of which are the stripped down models and others are the deluxe models, a large number of different kinds of compression refrigerators are available. The compression type has included many variations as regard to drives and compressors. From the standpoint of care required, however, it is important to know that in general there are two types of motor-driven units in electrical refrigerators: the sealed type and the open type. The sealed type unit has the motor and compressor directly connected together, and these parts are contained inside permanent and air-tight housing.

At the time of manufacture a supply of oil is placed inside the housing thus obviating the necessity of oiling throughout the life of the refrigerator. The open type unit has the compressor driven by means of a belt or shaft from an external electric motor. This type needs occasional oiling of its motor. Removing the dust and dirt regularly from nonsealed motors is also important. If it should be necessary to shut down a refrigerator with an open-type unit for any length of time, it should be checked by a serviceman at the time it is shut off. Failure to do this may result in leaks in the system and the resultant loss of refrigerant.

Either type of compression refrigerator operates by the use of various refrigerants such as sulfur dioxide, methyl chloride, ethyl chloride, ammonia, volatile hydrocarbons, and others having low boiling points and high latent heat of vaporization. When poisonous chemicals are used as refrigerants, they are usually identified by a strong, pungent odor. However, with the sealed type there is little chance of leakage of the refrigerant.

The evaporator is inside the food compartment and is the point at which the refrigerant vaporizes, drawing on the heat in the stored food to bring this about. Coils containing the evaporating material enclose the space where freezing and low cold storage may be accomplished, and furnish the heat-absorbing unit for the food compartment. Most evaporators are made from a metal with high heat conductivity, so that heat will pass through it quickly. This makes possible a rapid transfer of heat from the food compartment to the refrigerant. The size and shape of the evaporator is important. The ice cube capacity varies from 42 cubes or six pounds to 99 cubes or 12 pounds. With the advent of quick frozen foods it is desirable that the freezing unit be of a size to accommodate the packages and of a temperature low enough to keep the food frozen. Some refrigerators have been developed which have large freezing units above or below the main food storage chamber.

Defrosting of the evaporator is an important part of keeping the refrigerator at its most efficient work. The instructions



Courtesy Frigidaire Division, General Motors Corporation

The subfreezing unit should be large enough to hold several packages of frozen foods.

of the manufacturer should be followed. The cost of operation will be reduced and the life of the refrigerator will be lengthened if no more than one-quarter inch of frost is ever allowed to accumulate on the unit. The frost should always be melted off, never chopped of with a knife or ice pick. Removing freezer trays, especially if there is ice in them, hastens defrosting. When the evaporator is completely defrosted, everything should be taken from the food compartment and it with all other parts of the cabinet should be washed with water to which baking soda or trisodium phosphate has been added.

In the absorption type of refrigerator, the main parts are the condenser and the heating unit outside the refrigerator, and the evaporator and thermostat inside. The refrigerant is usually ammonia. The vapor from the evaporator is absorbed in a suitable substance, such as water or other liquid, or by a solid which is capable of absorbing large quantities of vapor. Subsequently, the substance containing the absorbed vapor is heated usually by a gas or a kerosene flame but sometimes by an electrical heating unit. The vapor is driven off by the heat, then it is cooled and condensed to a liquid which is returned to the cooling unit. Machines of this type have few or no moving parts, and practically all of them are noiseless in operation. The absorption type of refrigerator requires a radiator type of construction in the condenser for cooling the refrigerant. Some of the machines using a liquid absorber are continuous in operation, the heat being applied always to one part, while the liquid is caused to circulate. Others are of the intermittent type, the heat being applied for a time to one part, then to another part, or to one part at intervals. In matters of cooling foods and the general care of the refrigerator, most of what has been said of the compression type of refrigerator applies also to the absorption type.

Other points of importance in the care and use of the compression or absorption types of refrigerators include:

1. The evaporator should be wiped dry after defrosting and before setting the controls back to normal operation.
2. The complete food compartment of the refrigerator should be thoroughly cleaned at regular intervals.
3. Food should be stored in as small a container as possible. Both space and refrigeration energy are wasted by containers that are too large.
4. Foods should be allowed to cool before being placed in the refrigerator.
5. Certain foods should be eaten as soon as the desired chillness has been reached because flavor is lost soon thereafter.
6. The outside of the refrigerator may be washed with mild soap suds and the luster may be preserved with a thin coat of wax.
7. The electric motor should operate only from one-third to one-fifth of the time. If it runs more than this the refrigerator should be checked by a reliable repair man.
8. The refrigerator should set at least 2½ inches from the wall, and there should be at least six to eight inches of headroom above the cabinet.

A recent development in the field of refrigeration is the manufacture of units for the storage of frozen foods and for the freezing of foods in home. These units are of two general types: the frozen food storage chest which maintains a temperature of zero degrees, and the combination frozen storage and fast freezing unit capable of temperatures of 20° to 30° F. for the fast freezing of foods. Both types are being manufactured in many different sizes. The storage unit which is designed principally for the urban market is in general smaller than the combination unit designed for farm homes.

The chest-type units designed principally for storing food already frozen have a capacity of four to 12 cubic feet. Features in these units include metal food baskets for ease in locating foods, an electric light, and a thermometer.

The models for quick freeze and storage combinations vary in capacity from six to 26 cubic feet. Upright models in these machines have closed compartments or drawers designed to be easily pulled out even when filled. These models are economical of current because the whole box is not subjected to warm air each time the door is opened. On at least one model an alarm system goes into action whenever power fails for any reason. For farm homes many designs are offered, including walk-in frozen food storage units of from 150 cubic feet to 750 cubic feet.

The mechanism of a mechanical refrigerator is usually too complicated to permit home repairs. It is necessary, therefore, when choosing a refrigerator of this type to be assured adequate local servicing. The choice of a machine which is beyond the experimental stage and which is made by a well-established manufacturer is advised to eliminate the necessity of early repairs, and to insure replacement of defective or worn parts when necessary. Safety requirements for electric refrigerators are found in the *Standards for Unit Refrigerating Systems of the Underwriters' Laboratories,* and for gas refrigerators in the *American Standard Approval Requirements.* Any of these kinds of refrigerators should conform to these requirements. The label on a mechanical refrigerator should include the following information: the name of the manufacturer of the mechanical equipment and of the organization sponsoring the completely assembled refrigerator; the address of the organization from which maintenance and repair service can be secured; the nature of the refrigerant used; instructions in the use of a temperature-regulating device; and the capacity in cubic feet and the area in square feet of shelf space.

When a mechanical refrigerator is installed, the service man generally gives directions for the care of the mechanism. These directions should be followed carefully. In some mechanical refrigerators the motor is packed in grease and needs no attention, but others need occasional oiling. All types of mechanical refrigerators must have the cooling unit defrosted according to the manufacturer's directions when the frost is about one-fourth inch thick.

Suggested Activities

1. The design and construction of refrigerators have much to do with the efficiency and usability of the machine. Examine carefully at least one refrigerator. Record your findings thus: make of refrigerator, manufacturer, price, size, ice cube capacity, frozen food capacity, position of cooling unit, type of refrigerating system, noise of operation, construction, exterior and interior finish, thickness of insulation, tightness of door, special convenience.
2. Plan the proper refrigeration storage in this refrigerator of the foods commonly used in your home.
3. Compare the models of a given manufacturer's refrigerators found on the local market. Evaluate the improvements offered by model in price range. Which model do you regard as the best value? Compare this model with a similar model made by a different manufacturer.

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Problem 4. HOW MAY DESIRABLE CLEANING PROCEDURES BE ESTABLISHED?

Cleanliness is desirable not only from the standpoint of health but also from the standpoint of appearance. Cleanliness of person, of clothing, and of the house has social significance. Families have been ostracized from the social group of which they might expect to be a part because they were notoriously "dirty." Aside from the immediate effect of soil to appearance, materials last longer and present a better appearance for a longer length of time if they are kept clean. This applies to fabrics used for clothing and household textiles, and to the finishes on wood, plaster, and metals.

To achieve cleanliness in the home, considerable time and energy are required of some member or members, or as an alternative, money must be expended to pay for its being done by an outside agency. Various things contribute toward lightening the load imposed by keeping the household clean and in order. Among these are a simple standard for furnishings and wearing apparel; co-operation from family members to exclude dirt and prevent disorder; individual efficiency of the persons doing the cleaning; and a well-planned cleaning program based on a knowledge of good methods and possession of efficient equipment.

A simple standard for furnishings and wearing apparel may be especially necessary during that part of the cycle of the family life when the children are young. Uncrowded furnishings with finishes not easily destroyed, decorative objects limited in quantity and kind to those that are effective but easily cared for, a livable and workable household arrangement—these are evidences of a simple standard. Wearing apparel that does not require unusual care in cleaning, that may be laundered and ironed easily, and that does not soil readily is also evidence of a simple standard.

The co-operation of family members in keeping the materials in a house clean and orderly is shown in a number of ways. First among these is an attitude of mutual helpfulness and thoughtfulness among the family members. This will lead to appreciation of the homemaker's tasks. Remembering to pick up after oneself and thus to contribute to the orderliness of the house are useful expressions of a desirable attitude. Then, too, the age and the ability of the family members to perform helpful tasks affect their co-operativeness. A family consisting of small children can give very little help, while one consisting of adolescents or adults can do a great deal. Old people sharing a home may contribute in this manner and by so doing may achieve a feeling of belonging. The amount of time which each member has to devote to tasks affects greatly his ability to co-operate. Children and young adults whose time is kept crowded with educational or social activities cannot be expected to contribute greatly to the work of keeping the materials of a house clean and in order. However, there may need to be a weighing of values so that the worth of home duties may be considered along with the worth sought in the outside interests. Individual efficiency is an important factor in contributing toward ease in keeping a house clean and in order. Good physical health which gives strength, energy, balance of body position, and likewise good mental health which furnishes drive, perspective, and organization for the work are known to contribute to personal efficiency.

A well-planned program that is based on a knowledge of good methods and aided by the possession of efficient equipment is important in lessening the labor involved in maintaining cleanliness. This program might well include a time and a method of doing the laundry as well as other cleaning about the house.

Cleaning is considered one of the heavier household tasks, because of the physical labor involved and because of the amount of time usually expended on it. Of course, differences exist among households. A South Dakota study indicates that the time used in caring for the house varied from less than 5 hours to 15–20 hours per week in the homes studied in that state. These findings are confirmed by studies in Rhode Island and Washington.[1]

The table on this page shows the proportion of time spent in the care of the house in South Dakota.[2]

No of Women	Range per Week	Average per Week		Average per Day	
		Hrs	Min.	Hrs.	Min.
4	Less than five hours	4	02	0	35
44	5–10 hrs.	7	47	1	07
41	10–15 hrs.	12	18	1	45
11	15–20 hrs.	16	37	2	22

The table on page 590 shows the average, lowest, and highest amounts of time spent during the week by rural Rhode Island homemakers in various activities: [3]

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[1] Inez F. Arnquist and Evelyn H. Roberts, *The Present Use of Work Time of Farm Homemakers*, p. 24. State College of Washington, Agricultural Experiment Station Bulletin 234, 1929: "*The Care of the House*. The care of the house takes an average of 11.7 hours per week, or nearly one-fifth of the total time spent in homemaking. Cleaning and straightening takes 7.7 hours; the care of fires, 2 hours; and the care of the yard and other minor activities, 2 hours during the week. The time spent in the care of fires is undoubtedly low, for putting wood and coal on the fire takes less than five minutes, and this time spent many times a day in keeping up fires is not recorded."

[2] Grace E. Wasson, *Use of Time by South Dakota Farm Homemakers*, p. 18. South Dakota State College, Agricultural Experiment Station Bulletin 247, 1930.

[3] Margaret Whittemore and Berniece Neil, *Time Factors in the Business of Homemaking in Rural Rhode Island*, p. 9. Rhode Island State College, Agricultural Experiment Station Bulletin 221, 1929. Excerpt from Table 1.

Activity	Time Spent By Homemaker							
	Average				Lowest Per Week		Highest Per Week	
	Per Week		Per Day					
	Hrs.	*Min.*	*Hrs.*	*Min.*	*Hrs.*	*Min.*	*Hrs.*	*Min.*
Cleaning...........	7	35	1	05	1	45	16	15
Other care of house and grounds......	2	05	....	......	0	10	11	30

A more recent study by Muse indicates that housecleaning and care takes 22 per cent of the time spent in housework.

Because cleaning does require considerable time and energy, and because it is sometimes slighted, a cleaning program might be established for daily, weekly, and occasional cleaning. The occasional cleaning might occur fortnightly, monthly or seasonally as the situation demands. The structure of a well-planned cleaning program will be dependent upon the standards for cleanliness and order desired, upon the climatic conditions, upon the methods used, and the equipment available. It will distribute heavy cleaning and eliminate unnecessary steps and be adapted to the materials and finishes being cleaned. A well-planned cleaning program implies good methods and adequate equipment. The chart on pages 592 and 593 illustrates a suggested program for cleaning most of the things used in a house.

Some psychologists attribute an orderly house to an orderly mind, but claim that house and mind alike create an interplay, one on the other. An orderly person entering an orderly house or room reacts favorably toward it, hence is able to approach the job at hand with vigor. The same person entering a room or house in disarray must perforce suffer a slowing up of his mental processes or set the place in order. Conversely, a disorderly person may be stimulated by order but will soon destroy it by his inability to maintain order in his mind and work.

No house could be said to be in order unless it is clean. The merits of having every thing in its place are lost by accumulations of dust and other soil on surfaces, and by deterioration of finishes. Hence, an orderly house will be cleaned by the removal of all kinds of soil and by the restoration of the original qualities of finishes.

Dirt has been defined as "matter foreign to the article in its pure state." From practical experience it is known to include the readily evident forms of surface litter, as threads, bits of paper, hair, balls of lint, ashes, and other similar materials; dust and sand brought in on shoes, or sifted in about poorly fitted or open windows and doors; and organic matter, such as food smears, greasy finger prints and sooty carbon films and marks. No part of the house and no article of its furnishings are free from exposure to dirt. Hence, consideration of ways and means of removing dirt of these several kinds from the various surfaces found in the house is essential to efficient plans for cleaning. The surfaces found in the house differ widely in type. The ceiling and walls may be papered, plastered, panelled wood, or blocks of glass; windows are of glass, and doors may be of glass or wood; the floors may be hardwood, softwood, tile, or linoleum, covered in part or in whole with rugs or carpets, varying in weave; woodwork may be painted, enameled, waxed, or varnished; the furniture may be the walnut of Victorian days or the chromium-plated tubular models of ultra-modern design; the decorative objects and paraphernalia for living may include books, pictures, musical instruments, and even the overcrowded whatnot with its china dogs, glass vases, and small metal figurines.

The essential equipment for cleaning, and the methods to be used are determined by the treatment required of the surfaces of these numerous and diverse articles. It may be that the dirt can be wiped off, or brushed away, in which case the tool for brushing or wiping must be chosen with due regard for the specific surface. In almost any climate dust settles on walls, which has an unpleasant and deteriorating effect. The finish on wall paper may be destroyed by rubbing its surface with anything other than a soft material. A special wall mop, or a clean, untreated dust mop is suggested for use when dusting wallpaper. A rough-plastered painted wall will become permanently discolored if dust and soot are not brushed out

PROGRAM FOR DAILY, WEEKLY, AND OCCASIONAL CLEANING OF A HOUSE

Daily Cleaning	Weekly Cleaning	Occasional Cleaning
Living Area Dust mop bare floors. Dust flat surfaces of furniture with hand duster. Remove unwanted newspapers and circulars. Straighten furniture. Pick up miscellaneous articles. Lay material for fire in fireplace.	Clear surfaces requiring dusting of all accessaries including pottery, pictures, small lamps, baskets, books, and textile coverings. Collect those needing washing or polishing. Clean out ashes in the fireplace. Dust ceilings and walls. Dust door and window casings, shades, curtains, and Venetian blinds. Dust windows, mirrors, pictures, and light fixtures. Dust radiators or registers, and baseboards. Dust upholstered furniture. Dust and rub wood furniture. Clean the rug by vacuum cleaner or sweeper.* Dust mop the bare floor. Replace accessories. Care for cleaning equipment.	Dry clean, shampoo or repair upholstered pieces. Wash picture glasses and frames. Dust and rearrange all books on shelves. Air cushions. Wash pottery. Clean lamp shades. Polish fireplace tools and tiles. Brush ceilings and all walls. Wash, oil and polish all woodwork. Wash or air and press curtains and draperies. Wash windows. Shampoo rug and upholstered furniture. Clean, wax, or oil and polish wood furniture. Clean, wax, and polish bare floor. Clean electric light bulbs and fixtures and switches. Clean registers or radiators.
Rest Area Bedrooms Make beds. Straighten desk, dresser, and personal things. Dust flat surfaces. Dust mop bare floors. Empty waste paper baskets.	Air mattress and heavy bedding. Dust rail of bed. Change linen. Proceed as for the living area.	Sun mattress and heavy bedding. Dust springs. Wash mattress covers and pads. Wash shoe and laundry bags. For the things which are the same as those used in the living area use the same procedure.

* If rug must be cleaned with a broom, it should be sprinkled with water or dry salt and this cleaning process should follow collection and dusting of accessories.

ROGRAM FOR DAILY, WEEKLY, AND OCCASIONAL CLEANING OF A HOUSE—CONTINUED

Daily Cleaning	Weekly Cleaning	Occasional Cleaning
athroom		
Clean lavatory and bathtub. Polish brasswork. Empty waste paper basket. Wipe up *any* spots. Dust mop floor. Change linens if necessary.	Scour or otherwise thoroughly clean lavatory and bathtub. Clean stool. Polish brasswork. Wipe waterproof walls, woodwork and mirror. Wash water glasses. Change linens. Mop floor and apply whatever polish is desirable for its finish.	Wash windows. Wash waterproof walls, woodwork and mirror. Wash waste paper basket. Rearrange storage spaces. Treatment of windows same as in living area.
ining Area		
Dust dining table and tea-cart before and after each meal. Remove all food spots. Store linen carefully. Keep storage spaces in order. Dust or crumb floor after each meal. Dust flat surfaces. Dust mop bare floors.	Polish silverware and brass. Clean linen drawers. Proceed as for the living area.	Clean, wax, or oil and polish dining table and tea-cart each fortnight at least if place doilies are used. Clean and straighten cupboards. For the things which are the same as those used in the living area, use the same procedure.
itchen		
Empty garbage can at least once and other times as needed. Empty waste paper basket. Sweep floor after each meal preparation. Wipe up any spots on floor, sink, or cabinets as they are made. Clean stove (1) Its heating units, (2) Its frame. Wash out dish cloth. Change linen as needed.	Sterilize garbage can. Wash waste paper basket. Mop floor and apply polish desirable for its finish. Change paper on shelves, as needed. Scour pots, pans, cutlery, and sink. Thoroughly clean refrigerator.	Wash windows. Wash walls and woodwork. Wash inside of cabinet, shelves and drawers. Thoroughly clean stove.

vigorously, hence a stiff wall brush is necessary for cleaning.

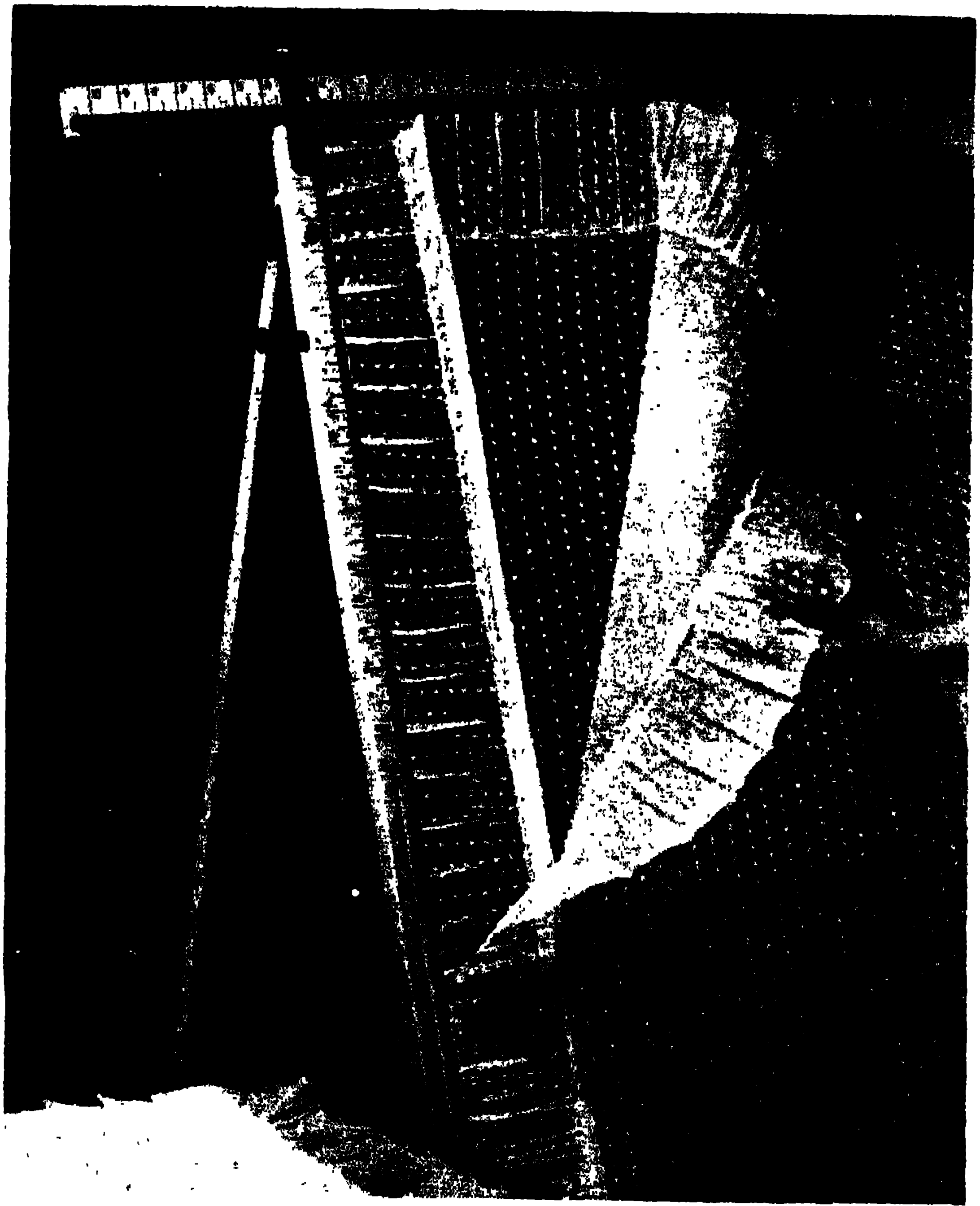
The varnished woods of floors or furniture require frequent dusting to keep them in good condition. Dust mops, untreated or oiled only enough to hold the dust, are used both for floor mops or for hand mops when dusting large surfaces of furniture. A general purpose floor mop will usually be mounted on a flexible shaft and will be pointed in shape to reach into corners. Mops should be made of soft material which is easily laundered, and they should be laundered often. Fine bits of sand clinging to a mop act as abrasives and may cause the mop to soil objects more than to clean them. If large areas of waxed or varnished floors are to be cleaned, the floor mop should then be wide to facilitate rapid cleaning. A short handled, flat surface mop used for daily cleaning of flat surfaces of furniture will save time and be easier to use than a dust cloth. Occasionally varnished woods, of both floors and furniture, need thorough cleaning. This may be done by washing in a suds made with mild soap and tepid water. A small area, or a few square feet, should be washed at a time, the soap being removed immediately with a cloth wrung from clear tepid water, and the surface then being dried with a soft cloth. The luster may be heightened by applying furniture polish or wax, followed by rubbing. Scratches may need only furniture polish or oil to darken them, but if the scratch is deep enough, a stain of the proper color may be necessary.

Windows and flat glass surfaces usually should be cleaned by washing, although this process may be postponed if the glass surface is wiped occasionally with a clean dry cloth. Several appliances and materials are available to facilitate the cleaning of glass surfaces. Glass that is merely dusty can be wiped with soft tissue or newspaper. Four tablespoons of dilute ammonia added to a gallon of clear warm water will remove an oily film laid down by a smoke-laden atmosphere. A chamois skin is better for drying and polishing than a cloth, which is apt to leave lint. The chamois can also be used to wash the glass if it is rinsed between the processes. Commercial liquid glass cleaners, or pastes made from whiting or a cleaning powder and water may be rubbed on and wiped off if desired. If the paste is used, dust from it is scattered about, and a general dusting of the room may be necessary after its use.

Metals such as brass and copper, used for decorative purposes, require occasional removal of tarnish. They can be protected by a coating of lacquer which needs only to be wiped with a damp cloth. The lacquer can be removed with denatured alcohol. Unlacquered brass and copper can be polished with a vinegar and salt solution, with a fine abrasive as whiting moistened with oxalic acid, or with a commercially prepared metal polish. Other decorative metals such as chromium or spun aluminum require only to be washed with soapy water and dried with a soft cloth.

Certain textile fibers used in the furnishings of the home require special attention. Glass curtains may be freshened by shaking out the dust, but they need occasional laundering. The material out of which they are made is usually quite fragile and requires careful handling. If possible, glass curtains should be stretched on a frame to dry, for it is difficult to iron them and retain a good shape. Some dust on draperies may be loosened by shaking, but this requires that they be taken down from the windows. The draperies may be left hanging at the windows and the dust removed by a medium stiff bristled brush, or by vacuum cleaner attachments. All creases and corners as well as the whole surface should be gone over. If vacuum cleaner attachments are used straight strokes accomplished with slow motion are most effective. Some draperies may require occasional laundering or dry cleaning.

Upholstered furniture and rugs are soiled with two kinds of dirt aside from surface litter. One kind is dust and sand, part of which is scattered through the upper part of the pile, and the rest is embedded in the furrows and pockets of the body. This dirt is gritty in nature and tends to cut the yarn fibers and to destroy the pile. The other kind of soil is gummy material known to be a mixture of oil, grease, wax, asphalt, rubber, and other similar substances. This material coats wool pile and gives it a dull, dingy appearance, and,



Courtesy The Crowell Publishing Co. Photograph by Van Nes-De Vo

One method of stretching glass curtains. The ruffles can easily be ironed out.

in addition, it changes the properties of the other soil in that it becomes a sticky mass of particles that is difficult to remove.

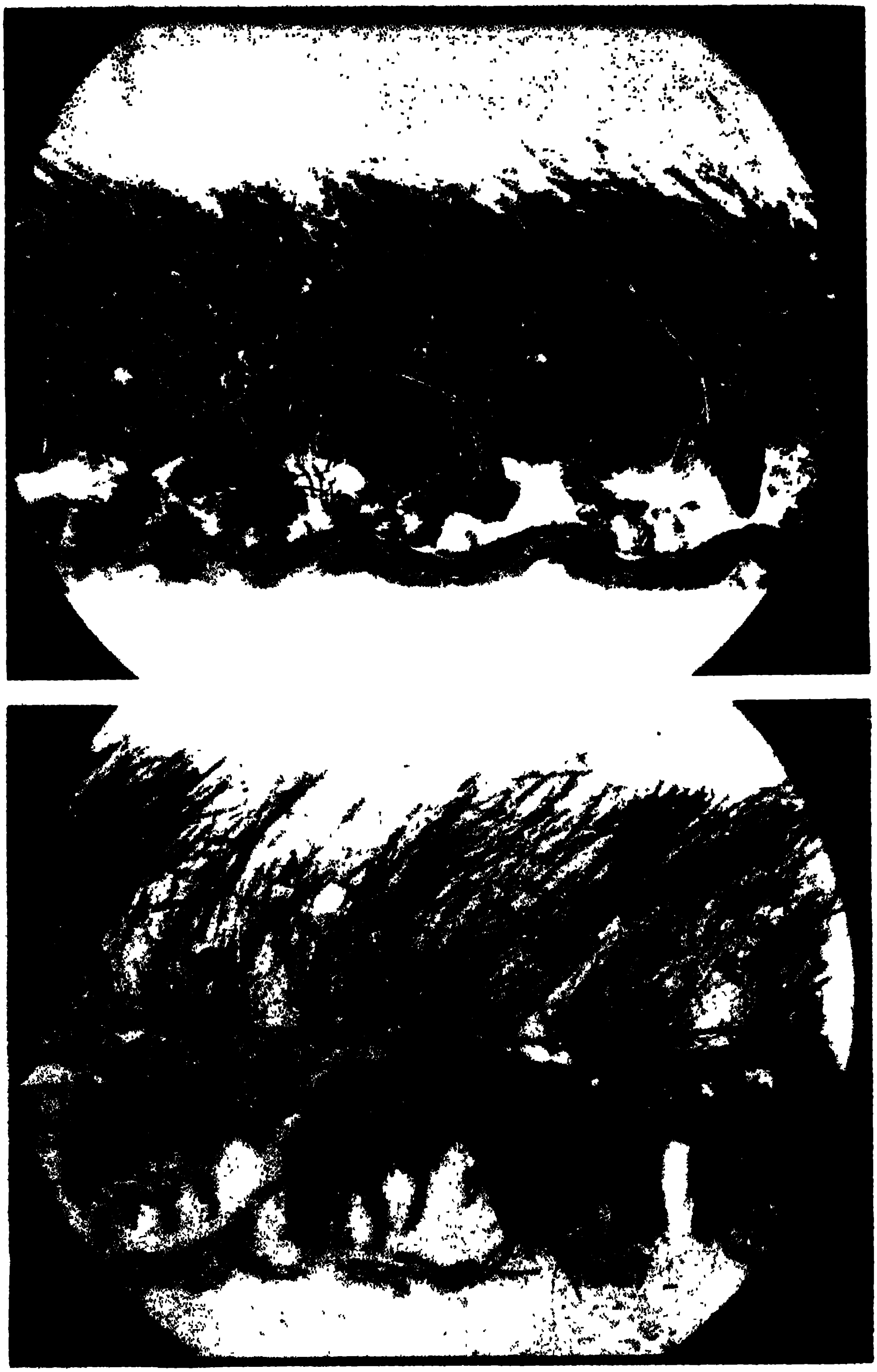
Upholstered furniture should be thoroughly cleaned with a bristled brush or a vacuum cleaner attachment to dislodge and to remove dust and also any moth eggs or larvae.

Upholstered furniture and rugs occasionally need a shampoo to remove embedded waxy soil and to freshen them. A commercial cleaner or soap suds may be used. In either case a small part should be cleaned first to make sure that the fabric is fast in color. If soap suds are used, a thick dry suds from a thin soap jelly should be whipped up in a bowl. The suds should be applied to a small area at a time using a brush with bristles of medium stiffness. The suds should be sponged off immediately with a cloth wrung from clear water. It is important to remove all the soap and to dry the furniture or rug as rapidly as possible.

Rugs may be cleaned with a broom, but this method removes only surface dust and scatters much dust in the air. A vacuum cleaner is a better tool to use for cleaning any piled surfaces. A vacuum cleaner consists of four major parts essential to drawing dirt from the object being cleaned: a nozzle, a fan, a motor, and a bag. The nozzle makes the contact with the floor covering; the fan supplies the suction which draws out the dirt; the motor supplies the power which runs the fan; and the bag receives the dirt.

Several kinds of vacuum cleaners are made, the usual classification being according to the methods of cleaning action employed by the machine. The straight suction type and the motor-driven cylinder type are the most common. The straight suction type cleaner depends almost entirely upon suction for its cleaning action and has no moving parts in the nozzle. The motor-driven cylinder type employs suction, beating, and sweeping and has a moving cylinder as a part of the nozzle.

The cleaners of the straight suction type are differentiated by the manner in which the nozzle is supported. It may be the coventional upright handle model on which the nozzle is completely or partially supported by wheels; or it may be the more recent tank type where the nozzle is unsupported and is attached to the end of a long tube which in turn is attached to a tank containing the fan, motor, and bag. In either case the nozzle may be equipped with a stationary brush to provide a sweeping action. The brush may be detachable, adjustable,



Courtesy The Hoover Company

Photomicrograph of a cross section of an exceedingly dirty rug, and of one that has been cleaned.

or floating. Because the cleaning action is dependent almost entirely upon suction and the slight agitation caused by the movement of the nozzle and the brush over the pile, there must be a high degree of suction for the cleaner to be efficient.

From the standpoint of appearance there are three cleaners: the upright handle, the water-basin, and the tank. From the standpoint of the cleaning action employed by the machine, however, there is the straight suction type and the motor-driven cylinder type. The straight suction type cleaner has no moving parts in the nozzle and depends entirely upon suction for its cleaning action. Sometimes a brush intended to stir up dust is installed in the nozzle, but it must be carefully adjusted lest it weaken the seal which the nozzle must make with the rug to be efficient. In order to be effective in removing dust there must be a high degree of suction. Some of the upright handle vacuum cleaners are of this type and all of the water-basin and the tank vacuum cleaners are of this type.

The water-basin type of vacuum cleaner is the most recent development. It has the motor and fan mounted over a basin which holds a few quarts of water. The dirt is collected into the water by the hose attachments similar to the tank type. The dirt and water are discarded together.

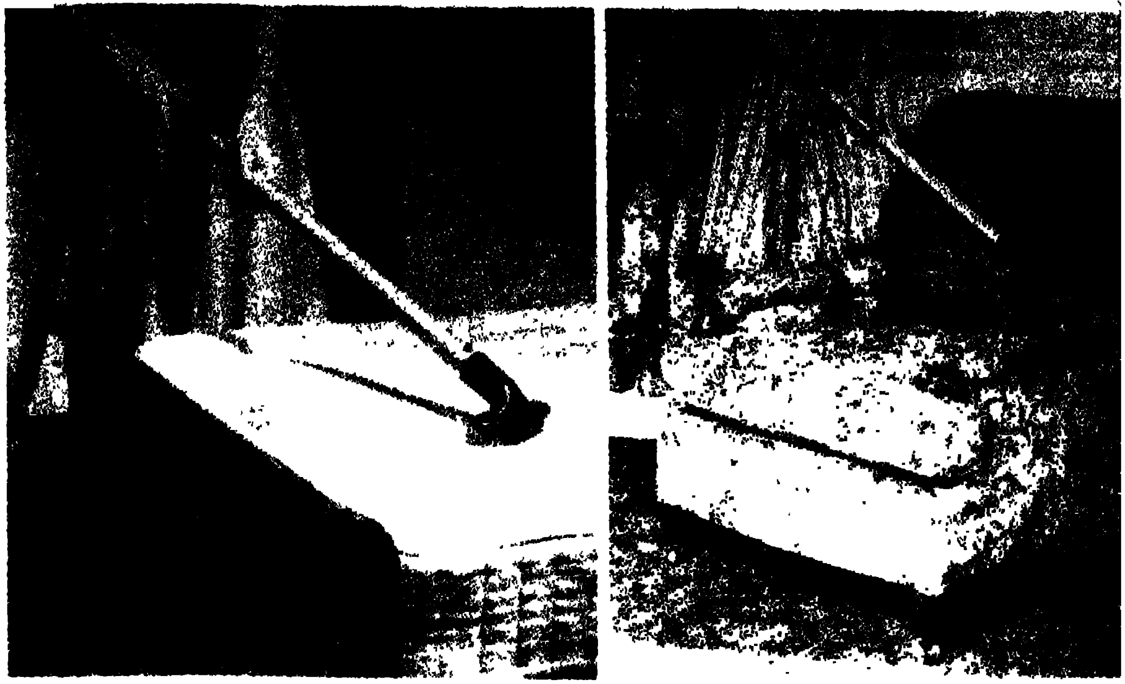
The motor-driven cylinder type has some moving device in the nozzle designed to stir up the dust within the area covered by the nozzle. Such devices include rotating brushes, bars, vibrators, and combinations of these. Because the efficiency of this group of cleaners depends not only upon suction but upon the agitation of the motor-driven device in the nozzle, it is important that the rotating device be adjusted so that it extends slightly below the nozzle lips. Bristles of the brushes may wear away in time and they must be replaced eventually. This type of nozzle is found always in the upright models.

There has been some evidence to support the idea that most tank and water-basin models show a lower rate of cleaning than the better quality models of upright vacuum cleaners. This, however, does not necessarily make the tank models less desirable than the upright cleaners. Greater maneuverability, greater ease in changing attachments, and other factors are desirable features of the tank model type of cleaner.

Various conveniences are found on vacuum cleaners. On the upright handle vacuum cleaner, there should be a device for height adjustment so that the cleaner will operate efficiently over various heights of pile. This device may or may not be automatic. Rotating brush type cleaners may have a device by which the position of the brush is adjusted as it wears off, so that it is moved closer to the lips of the nozzle as becomes necessary. Others must be adjusted as the cleaner is used on various heights of pile and as the brush wears off.

Because the dust bag or the water-basin should be emptied after each cleaning, the bag or water-basin should be constructed to facilitate this operation. The opening should be large enough to permit the dirt to fall out easily, and the bag or water-basin should be properly shaped to lessen the danger of spilling dirt as it is detached. The handle should be adjustable to three positions: vertical for storage; normal angle for cleaning; and horizontal for cleaning under furniture. The most convenient position for the switch is near the handle grip.

The cord of an electric cleaner should be flexible, rubber covered, and about 20 feet long, with its durability considerably increased where the cord is most likely to be sharply bent, or otherwise badly worn. Reinforcement could be either by a thickening of the rubber covering or by a coiled-wire reinforcement. To make the cord last longer, knots and kinks should be avoided, it should not be wound too tightly around the metal holders on the handle of the cleaner, and the cleaner should not be run over the cord. Most vacuum cleaners are equipped with dusting tools which may be purchased with the cleaner, usually at additional cost, although they are standard equipment on the tank models. In general, these consist of a flexible hose with swivel joints fitted with flat nozzles and several different sizes of brushes. The tank model of the straight-air suction type of vacuum cleaner is one on which the dusting tools are especially easy



Courtesy The Hoover Company

This cleaning tool has many uses.

to attach; therefore, it lends itself readily to situations where special cleaning tasks are important.

Hand cleaners are miniature vacuum cleaners. They may be either the straight-air or motor-driven part types. They are used for cleaning automobiles, upholstered furniture, and for other cleaning. They weigh from 3 to 6 pounds and have a handle for ease in manipulating.

The efficiency of operation of a vacuum cleaner is dependent upon the manner of using and care of the machine, as well as upon the design of the cleaner. The operator must understand the care and use of the cleaner which he is using. Some general procedures are effective. Enough time should be allowed to clean each rug. An efficient cleaner if used regularly will require 20 minutes per week to clean a 9 x 12 rug, and a larger percentage of dirt is removed if longer time is used. Operate the cleaner slowly in a straight line, lengthwise of the rug, going over each section at least twice to remove embedded dirt and grit.

The adjustable nozzles should be set to give the maximum agitation, a space of 1/16 to 1/8 of an inch above the pile being often suggested. Brushes should be adjusted so that they extend slightly below the nozzle. Any rotating parts should be kept free from hair and thread. Sharp metal objects should be picked up rather than swept up, as they are likely to injure the mechanical parts. The motor should be lubricated according to the directions provided with the cleaner. The bag should be emptied after every heavy cleaning use. Only as much air can go through the nozzle as can pass out through the bag. Bags should be turned wrong side out occasionally and brushed with a whisk broom. Cleaning by the manufacturer's service department every few years is desirable. Badly worn and frayed cord should be replaced with new cord approved by the Underwriters' Laboratories.

Regular weekly use of a vacuum cleaner should keep rugs in good condition. Seasonally it is well to use the vacuum cleaner on the rug first on the right side and then on the back of the rug. This will loosen heavy dirt which a second cleaning on the right side will then remove.

Suggested Activities

1. Mr. and Mrs. Smith and their children, Susanne 9, and Billy 7, live in a small town where Mr. Smith is a high school teacher. They have a 9 x 12 Axminister rug in the living room, linoleum in the kitchen, and finished floors with throw rugs in the other rooms. The Smiths have an upholstered living room suite and washable glass curtains.
   a. Make a list of the cleaning tasks that Mrs. Smith should do each week. Indicate what she should do daily, and once or twice weekly. Include one or two occasional tasks. How much time do you think it would take?
   b. List the cleaning equipment that Mrs. Smith needs to keep her home clean and orderly.
   c. List the ways that each member of the family may cooperate to make the cleaning easier.
2. Examine and use cleaning supplies. Make pertinent statements in regard to their effectiveness, convenience, uses, relative cost, or composition. Could a simpler less costly material be substituted for it?
   a. Furniture polish.
   b. Wax, oil base (paste), oil base (liquid), water soluble (liquid).
   c. Metal cleaners, brass and copper, silver, pewter, nickel and chromium, aluminum.
   d. Paint and varnish cleaners.

3. Examine and use small cleaning equipment. Make pertinent statements in regard to construction, convenience, or possible uses for it.
   a. Dust mop.
   b. Hand duster.
   c. Dust cloths.
   d. Wall brush.
   e. Dust pan.
   f. Others.
4. Examine and use various vacuum cleaners and determine the following facts about each: information on name plate, type of cleaning action, noise, type of nozzle, type of brush action, bag—size, material, convenience in emptying; cord—length, safety, covering; convenience of switches, method and ease of attaching cleaning tools.
5. What rules govern the care of vacuum cleaners?

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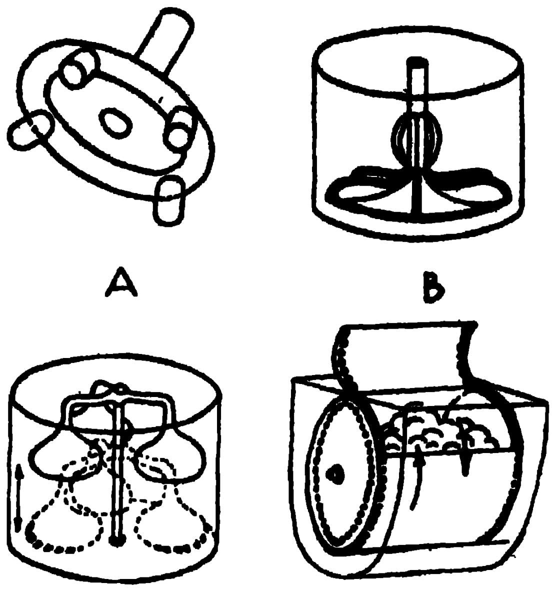
Problem 5. WHAT ARE IMPORTANT CONSIDERATIONS IN THE CHOICE OF EQUIPMENT FOR THE WASHING OF CLOTHES?

An understanding of washing principles is necessary for efficiency in laundering. The purpose of washing is to rid garments and household linens of accumulated dirt and soil. Some of the soil which clings to fabrics is soluble, but most of it must be removed mechanically. Rubbing soiled wet clothes over stones and pounding a rock with a garment were among the first methods used to remove soil mechanically. A washboard finally replaced the stones and rocks, and at last in this country washing machines have to a great extent taken the place of both methods. The purpose of the washing machine or any type of washing device is to clean fabrics by forcing water or suds through the clothes in order to hasten the process of dissolving soil or too remove the soil particles mechanically.

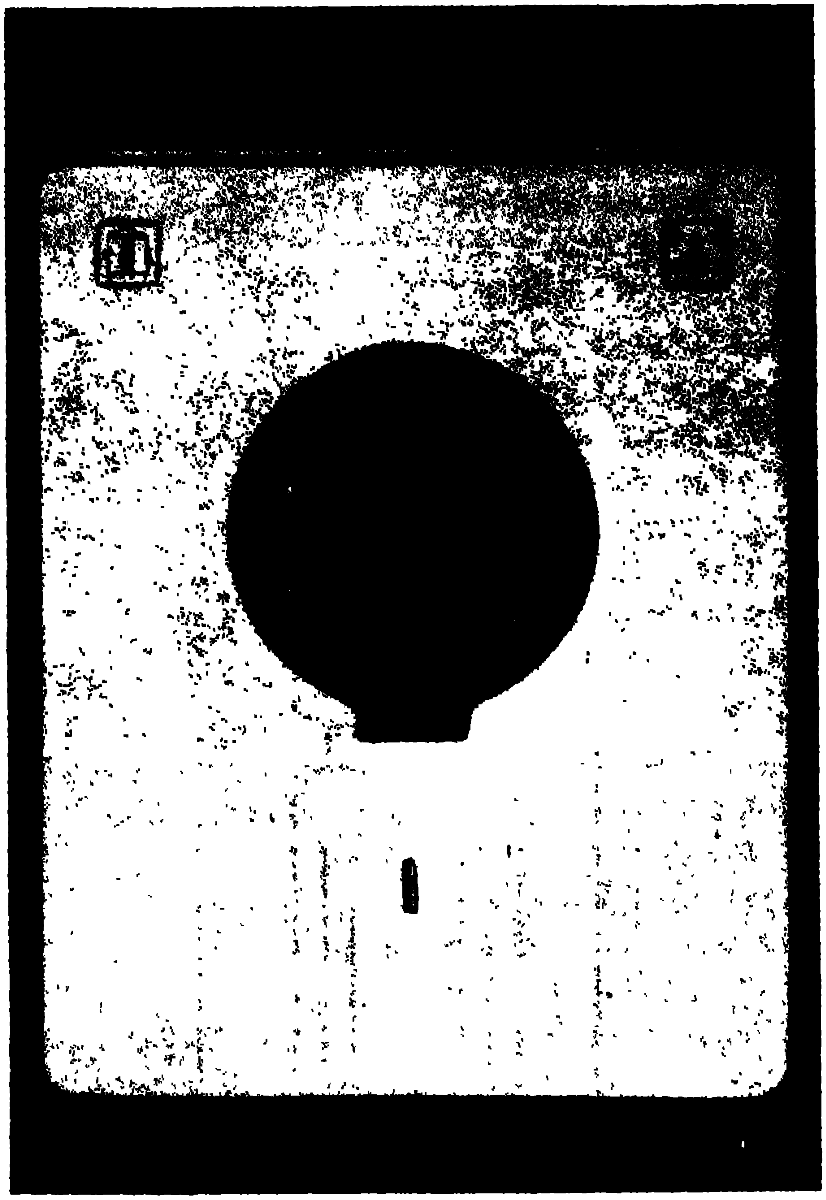
From the standpoint of the mechanics employed to force water through clothes there are three types of washing machines: the oscillating fin, the vacuum cup, and the revolving cylinder. The oscillating fin type is by far the most common. From three to five fins on a casing fit over an oscillating central shaft. The fins are of various shapes, sizes, and thicknesses. Some are perforated and corrugated. All are devised to agitate the water and clothes as the shaft rotates about one-half turn to the right and then to the left. Usually, the fins are located at the bottom of the shaft but in some few washers the fins are placed at the top of the shaft. The fins have usually been made of an aluminum alloy, but plastics and porcelain enameled steel have also been used. In hard-water sections of the country where large quantities of water softeners must be used, the reaction of alkalis on aluminum may corrode the fins slowly to an extent that they become sharp or rough and thus cause wear on the clothes. It is desirable to remove the casing around the oscillating shaft occasionally to check possible corrosion which may cause it to stick, thus resulting in undue strain on the mechanism.



The mechanics employed to force water through clothes are usually variants of the above types: A, dolly; B, agitator; C, vacuum cup; D, cylinder.

The vacuum-cup type is perhaps next in common use. It has inverted cups attached to arms, which are in turn attached to an upright shaft in the center of the machine. The down motion of this rod pushes the cups into the clothes, forcing them through the water, and the up motion of the cups produces a suction which pulls the clothes up. As the up and down motion takes place the cups are rotated slightly so that action will not be concentrated in one place.

The cylinder type of machine is made with a rotating perforated cylinder placed within a tub. Narrow shelves or ribs within the cylinder move the clothes upward and allow them to fall back into the water which fills the tub to about one-fourth the way up on the cylinder. To prevent the clothes from tangling, the rotation is reversed periodically. In the



Courtesy Bendix Home Appliances, Inc.

A cylindrical type of washer.

past, the use of this type of machine was largely restricted to commercial laundries. Here it is held in favor because the wash water can be drawn off and renewed without the removal of the clothes from the machine, thus simplifying the laundry process and reducing the hazard of damage during washing. An adaptation of this type of machine has been developed and marketed for use in the home. Automatic controls are provided for temperature of water, time of agitation, renewal of water, and removal of water. The laundry process is concluded by the machine at the point when the clothes are ready for the line.

Different types of materials have been used in making the tubs of washing machines. Wooden tubs were used first. They were rather unsatisfactory because they soaked up water during the washing process and then dried out between washings so that the cracks had to be soaked up before they could be used again.

Porcelain enameled steel is commonly used for laundry tubs. It is easily cleaned, does not rust, and as a rule does not chip, although careless handling may lead to such injury. To safeguard it, metal rims are frequently placed at the points where exposure to possible damage is greatest. A *baked-on enamel* is now used in place of porcelain enamel. The steel is spot welded to prevent leaks.

Aluminum is a popular material for washing machine tubs. The tubs are usually cast so that they are thick enough to be durable and there are no seams to contribute to the possibility of leaking. Such tubs are easily cleaned and do not rust. However, they do corrode when subjected to the action of an alkali. If a water softener must be employed to make hard water usable for laundry purposes, its action may be great enough to affect the durability of the aluminum tub. Assuredly it will lead to discoloration and some corrosion. In districts where the water is excessively hard, laundry tubs of material other than aluminum are advised. *Copper* has been used extensively because it does not rust. With care, it cleans easily and looks well. There are some objections to its use, however. It is somewhat expensive and the wash water cools quickly because copper is a good conductor of heat. Thin copper dents easily. The tubs are made from sheet copper which necessitates seams on the sides which must be welded if they are to be substantial.

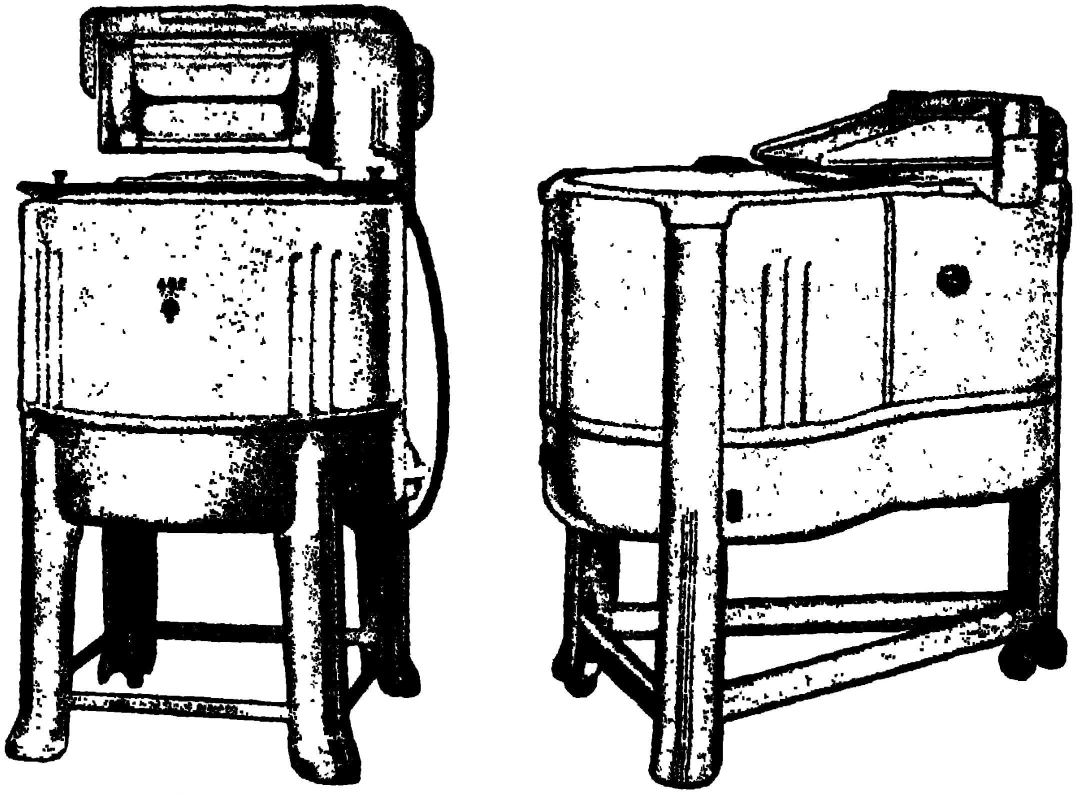
Nickel and chromium plates and *stainless steel* are all bright, durable, and easily cared for finishes, little affected by alkali and damage by chipping. They are, however, relatively costly, so their use has been limited to trim on machines in the upper price range.

The size of the tub is important because it limits the amount of water used and the weight of dry clothes it will wash successfully. The quantities of water needed to fill the tubs to the level recommended by the manufacturer may vary from 10 to 20 gallons. Because the water used must be hot, and because it requires from 15 to 30 cubic feet of manufactured gas to heat 10 gallons of cold tap water to a temperature desirable for washing (120° to 160° F.), the quantity of water needed may be a matter of considerable importance to some users.

The weight of clothes to be washed in a machine should correspond with the manufacturer's directions. In general, a safe average load is from 6 to 8 pounds of dry clothes. Overloading puts a strain on the working parts of the washing machine and prevents thorough washing and rinsing. A mixed load consisting of several large pieces such as sheets, and pillowcases makes for good circulation of water through the clothes. The weights of articles of clothing commonly found in the family laundry are shown on this page.

1 sheet, twin or three-quarters	1 pound
1 sheet, double or extra large	1¾–2⅕ pounds
3 pillowcases	1 pound
1 tablecloth, 2½ yards long	2 pounds
1 tablecloth, 1½ yards long	1 pound
2 luncheon cloths	1 pound
8 dinner napkins	1 pound
16 luncheon napkins	1 pound
6 linen hand towels	1 pound
3 bath towels, large	2 pounds
3 bath towels, small	1 pound
16 washcloths	1 pound
2–3 pajamas or nightgowns	1 pound
3–4 slips	1 pound
2–4 shirts	1 pound
2–4 dresses	1 pound
3 diapers	1 pound

Although not a part of the washing machine, rinsing tubs are usually necessary to the performance of the complete laun-



Courtesy Altofer Bros.

These two machines illustrate two methods of extracting water from clothes.

dry process. They may be stationary tubs supported from the floor or the wall and connected with the plumbing system. In this case they may be cast iron heavily finished with porcelain enamel, or they may be molded from a special water repellent cement. If they are portable tubs, galvanized iron is commonly used. Galvanizing is done by dipping sheets of iron into a large bath of melted zinc. These tubs have seams up the side and around the bottom which should be welded to keep them secure. Portable tubs may be supported by a wash bench or by securely fastened legs with casters which provide for easy movement of the tubs.

Wringers and dryers are usually an integral part of a washing machine. Their function is to extract as much water as possible from the clothes before and after rinsing. Wringers have two rubber rolls between which the wet clothes are forced in order to squeeze out the water. Hard rubber rollers are inflexible and extract the most water at the points where there are more thicknesses of cloth. Soft rubber rolls are more pliable and conform somewhat to the thickness of the clothes put between the rolls. Every wringer should have a safety release, preferably automatic in action, by which the rolls may be thrown apart easily if fingers or hair be caught. It should be possible to adjust the position of the wringer in relation to the washing machine to four places. It should be reversible in action and the drain should automatically tilt in the direction in which it is to be used. The care required by a wringer includes: keeping the rolls clean; loosening the rolls after use; oiling the gears when necessary. Clothes should be fed between the rolls as uniformly as possible.

Centrifugal or spinner dryers are used on some machines. The wet garments are lifted directly from the tub into the dryer. The clothes must be distributed evenly on all sides of the dryer to prevent undue vibration of the machine. The rapid rate at which the dryer revolves extracts the water by means of centrifugal force. There are two kinds of centrifugal dryers: In one a perforated dryer basket whirls and throws water out of the perforations. It is then drained or pumped away from the bottom. In another type, a container whirls around and throws water out the top through a spout. Either type of dryer may direct the water back into the washer or into a rinsing tub as desired. The advantages of a centrifugal dryer include the following: Time is saved because the operator can do other things while the dryer whirls; drying one lot of clothes in the dryer can take place while another lot is being washed in the tub. Clothes may be dried sufficiently in the dryer that they may be ironed immediately. On the other hand, there are certain disadvantages of centrifugal dryers. These include the following: Clothes must be lifted while they are wet, hot and heavy; a centrifugal dryer always causes some vibration of the machine which tends to loosen screws and bolts more than on other machines; and dryers filled too full may wear the clothes from touching hinges and tops. The perforated cylinder in the automatic washer is a spinner dryer in one of the stages in the washing circle.

In the power-driven machine the motor is an essential part.

Motors are usually ¼ H.P. in size and rotate at about 1,725 revolutions per minute. This speed must be reduced from the motor to the moving mechanical device within the washer or the wringer. This gearing down is accomplished by the use of cogs, or by a belt over a revolving shaft. The cogs in the gear boxes are packed in grease which should be changed once every two years or according to the directions of the manufacturer. Belts stretch with use, and the slack may be taken up automatically by a take-up device, or the belt may be removed and shortened. All gearing or moving parts should be enclosed to prevent dust, dirt, or water getting into them, and to protect children's fingers and clothing from being caught.

When selecting a washing machine it is desirable to choose one that has as many devices which contribute to convenience as possible. The best machines start the motor by a special switch, instead of mere contact of the attachment plug to the outlet. This is a safeguard against possible electric shock through handling a cord with wet hands. Lever controls for the mechanical devices within the tub, the dryer, or wringer should be at such a height that the person operating the machine need not stoop or bend over. The drain plug should be so placed that the tub can be conveniently drained. A few machines are made with a pump which removes waste water into drains or sink. The lids of a tub may be hinged or removable. A removable lid gives the problem of a suitable place to store it when the machine is open. A hinged lid must have very substantial hinges and it must be placed so as not to interfere with reaching into the machine.

Washing machines may be had at prices ranging from around $18.00 for hand-power machines to over $300.00 for completely automatic machines. A study of the cost of laundry in Kansas homes indicates that around $70.00 is the most popular price to pay. The initial cost, however, is not the only consideration when choosing a washing machine in a given price range, for cost of repairs, interest on the investment, and cost of power must also enter into the calculations. The table on page 612 indicates the average initial cost of

AVERAGE COST OF WASHING MACHINES CLASSIFIED ACCORDING TO PRICE RANGE, GIVING THE COST OF MACHINES, REPAIRS, POWER, AND INTEREST ON THE INVESTMENT[1]

Type of Washing Machine	No. of Families Reporting	Average Cost of Washing Machine	Average Cost of Repairs	Average Annual Interest at 4 Per Cent	Average Cost of Washing Machine Plus Interest Per Time Used	Average Cost of Power Per Time Used	Average Cost of Washing Machine Interest and Power Per Time Used
Hand Power	3	$ 18.30	$ 2.75	$0.732	$0.046	...	$0.046
Average	...	18.30	2.75	0.732	0.046	...	0.046
Gasoline							
Less than $50.00	2	25.00	...	1.000	0.106	0.046	0.152
$50 to $99.99	3	67.33	...	2.690	0.202	0.075	0.277
$100 to $149.99	3	118.33	15.00	3.730	0.289	0.047	0.336
$150 and over	3	187.00	8.00	6.680	0.478	0.039	0.517
Average	...	100.727	10.80	4.018	0.284	0.052	0.336
Electric							
Less than $50.00	31	34.660	3.125	1.385	0.0846	0.0697	0.1543
$50 to $99.99	54	69.403	3.773	2.776	0.1721	0.0660	0.2381
$100 to $149.99	29	116.380	5.390	4.655	0.2821	0.0566	0.3387
$150 and over	23	169.370	9.646	6.774	0.3550	0.0998	0.4548
Average	...	88.267	5.750	3.450	0.2064	0.0707	0.2771

[1] Ellen R. Lindstrom, *The Cost of Laundry in 188 Kansas Homes*, p 55. Unpublished Master's thesis, Kansas State College, 1937.

washing machines of various types, and the average cost per time used.

The efficiency and effectiveness of a washing machine is judged by the appearance and condition of the clothes which have been washed. Good materials and equipment having been selected, the method is important. It consists of five simple steps:

1. The clothes should be sorted into groups according to fabric, color fastness, and amount and kind of soil.
2. The clothes should be soaked in cool softened water for 5 to 10 minutes to loosen body soil and larger particles of dirt. Longer periods do not add anything to the effectiveness, but are harmful in the washing process only if injurious to color or fabric. Longer soaking may add to the convenience of doing the laundry.
3. The clothes should be agitated for from 5 to 15 minutes in hot suds in the washer. Suds seem to break down in the machine after 20 minutes. This permits the dirt to be reabsorbed into the fabric. The temperature must vary with the fabric being washed. Temperatures above 120° F. are harmful to silk, woolens, and many colored fabrics. Cotton and linen fabrics may be washed at any temperature from 70° to 210° F. but the recommended temperature is from 140° to 160° F.
4. Soap should be rinsed from the clothes by agitation in a hot rinse which duplicates the temperature of the suds. A cold first rinse contracts the fibers and may trap soil in them.
5. A second rinse, cool, is used to dislodge all remaining particles of soil or soap from the materials. A third rinse, cool, may be required if all the soap is not removed.

There are several minor phases in the procedure. Stains which are known to be stubborn should be removed before fabrics are placed to soak. Boiling is necessary only in sterilizing garments and materials which are not to be ironed. Bluing may replace the last rinse if desired. Bleaching should be carried on, if necessary, as a separate process.

The drying of clothes is an important part of the laundry process. If possible, white cottons and linens should be hung outside, but if unfavorable weather conditions or an unusual amount of smoke prevail, provision may have to be made for inside drying. In some cases a heated clothes drier such as is used in commercial laundries is used. Clothes are ironed much more easily if they have been dried hanging as straight as possible, or tumbled in the clothes driers so designed.

The day selected for doing the washing varies with home conditions. Tuesday is recommended for washing because numerous tasks arising in week-end activities are then out of the way and a heavy household task such as washing can be carried without making an overcrowded schedule. However, common practice seems to keep Monday as a preferred day in most households.

Suggested Activities

1. Observe a washing machine in operation and note the following points about it: make of washer, manufacturer, information on name plate, tub-shape, capacity, finish; drain-type, location in tub; agitator—material, type, vanes; wringer—size, rubber, adjustments, safety; cord; casters—material, adjustment; location of control switches; other conveniences; undesirable qualities.
2. What care is necessary to keep a washing machine in good order?
3. How much do washing machines cost on the local market? What is available at lowest price? What is available at highest price?
4. What circumstances favor the use of an automatic washer?

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Problem 6. BY WHAT STANDARDS SHALL IRONS AND IRONERS BE CHOSEN?

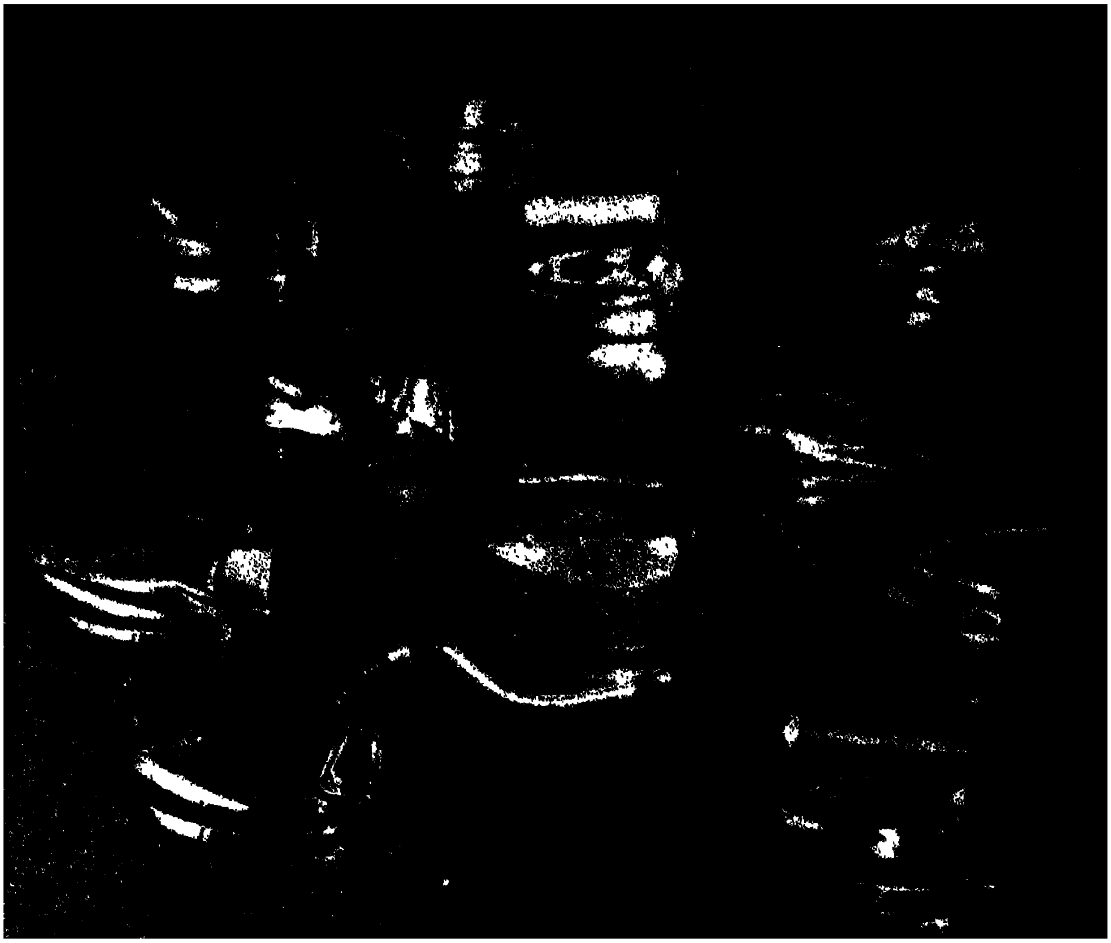
Garments and household linens which are made smooth and free from wrinkles have long been the desired standard in many parts of the world. The Chinese stretched garments on bamboo poles and the Greeks folded garments in chests devised with weights. The Romans used wooden mallets for heating garments to smoothness and later devised a press to serve the purpose. The Scandinavians used large wooden rollers and the Scots employed a linen smoother of black glass. Other devices were undoubtedly used, all of which employed weight or friction as a method of reducing the wrinkles found in linens after washing.

In the Middle Ages it was discovered that cloth pressed while being steamed would hold the shape into which it was molded. Numerous devices were invented by which heat and pressure could be applied to moist garments. Iron was the heaviest material available and is a good conductor of heat without being destroyed by the application of heat. It is natural that it should be used to fashion devices for the purpose of smoothing linens. Triangles of various shapes and sizes which were heated from the outside were used. Many of these were

Courtesy *Ladies' Home Journal,* Copyright Curtis Publishing Co.

When using a hand iron it is desirable to treat parts of a garment as flat work.

wrought in artistic style, even being covered on the outside with embossed silver, but all were heavy. By the end of the eleventh century smoothing irons were a part of the French household equipment. It was soon recognized that if the iron could be heated from the inside, the labor involved would be reduced. Accordingly, some were invented which were heated by placing burning charcoal or a piece of red hot iron inside. A much later model was heated by gas, connected to the iron by a flexible rubber hose and ignited under conditions of relative safety. Around 1900 an iron heated from the inside by an electric current was developed. A hole was cut in one of the old household sad irons then in vogue in which an electri-



Courtesy Federal Housing Administration

Hand irons are made in many different styles.

cal resistance coil was inserted and a flexible wire fastened to the coil, thus making possible a connection with an outlet. From this simple beginning the present efficient and popular electric iron has been evolved.

The heat is supplied to the bottom of the iron or sole plate which is the ironing surface. On older irons the sole plate was made of unplated cast iron, highly polished and then treated with beeswax to prevent quick rusting. The newer ones have been made of cast iron or steel. The size, shape, and finish of the sole plate are important. The size ranges from 21 to 36 square inches. Large irons are preferred if the ironing consists of many large, plain pieces. For general use the sole plate should be at least 25 square inches. There are many minor variations in the shape of the sole plate of electric and gasoline irons. Some models taper more at the point than others, some have rounded corners at the wide end, some have square corners. Others have points of different shapes on each end, the sole is lifted from the board by turning on the side, rather than being erected from the end. Sole plates with narrow points, beveled edges, and tapered sides make it easier to iron around buttons and smooth out pleats and gathers. Rounded backs help prevent wrinkling in backward movements of the iron.

The heat supplied to the sole plate of an electric iron is usually automatically controlled by a thermostat, located on the top of the iron or in the handle which shuts the current off when the iron reaches the temperature indicated and turns it on when the iron cools below that degree. This control is designed to control the temperature to that found best for the fabric being ironed. Suggested temperatures follow: [1]

Some rayons and nylon	300° to 350° F.
Other rayons and silk	350° to 400° F.
Light weight and starched cottons	400° to 450° F.
Pressing wool (over damp pressing cloth)	450° to 500° F.
Heavy cottons and linens	500° to 550° F.

Such a control reduces the cost of electricity by supplying only the heat needed; it reduces the fire hazard because the iron cannot heat to an excessively high temperature. An automatic heat control adds to the original cost of the iron; however, it affords a safety factor sorely needed. According to figures published by the National Safety Council, about 45 fires each day are started by electric irons lacking such control and heedlessly left standing. Automatic irons made for A.C. current must not be used on D.C. current, because the automatic control will not function and will burn out on direct current. A few A.C.-D.C. models of automatic irons have been available.

The cord and plug should fit into the iron plug guide easily but firmly. An antikink spring keeps the cord from bending and breaking where it is attached to the plug. A spring attached to the plug holds the cord away from the iron. One type of cord uncoils or coils automatically as the iron is pushed back and forth. The appliance and attachment plugs should be of a type easily attached without pulling on the cord. Be-

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[1] Good Housekeeping Institute, *Postwar Ironing Temperatures*, p. 5. Good Housekeeping Institute, New York, 1945.

Courtesy Beaumont and Hohman

Some steam irons can be used either with or without steam.

cause irons carry considerable current they should be attached to a convenience or service outlet rather than to a light socket. *If it is necessary to attach the iron to a light socket,* first attach the cord to the socket and then plug it to the contact pins of the iron. In disconnecting, pull the plug off first and then disconnect the cord at the lamp socket.

The use of electric irons is increasing as rural electrification develops. They vary in price depending upon the type of element, and the finish of the iron. The least expensive irons have a coiled element placed in the grooves of a porcelain insulated brick. These coils oxidize comparatively soon under frequent heatings and coolings. The sole plate on this iron is thin and the plating does not take a high polish. The area of the sole plate is less than in the more expensive irons. Medium-priced irons have a metal ribbon element wound on mica sheets. They often carry a 3- to 5-year guarantee, but usually last longer. In the highest-priced models the wire element is embedded in the insulating material and may carry a life-time guarantee. The casting of the sole plate is as far as possible without flaw, giving a smooth flat surface, and the iron is heavily plated and highly polished. Cordless electric irons are those in which the iron is heated by being placed on an electrically heated stand which supplies an electric current while the iron sits there. When the iron is being used no heat is supplied to it. It must be replaced on the stand to be heated again.

The newest development in electric irons is the steam iron. It is similar in its construction to the usual iron, except that one section is filled with water which is heated to form steam. This is emitted through a series of small openings in the bottom of the iron, thus dampening the fabric as pressing takes place. Most of these irons can be used only with water in them, but some can be used as an ordinary hot iron. Some have no thermostatic device, and others have a fabric dial.

An iron that is easy for the worker to use has a heat-insulated handle of a size and shape that is comfortable for the hand. Some handles are grooved to fit the hand, others are merely rounded. A special groove or projection on which the thumb can rest is a feature of some irons. Handles have been made of wood or some form of plastic material.

In recent years an iron has been developed which is heated from the inside by burning gasoline. These are widely used in areas where electricity is not readily available. Gasoline irons should have the same general characteristics as other irons as to shape, size, and weight. The handle must be farther away from the iron than on electric irons to protect the hands from the heat of the flame. It should be possible to regulate the heat by adjusting the flame from very small to large as found desirable. The cheaper gasoline irons have a sole plate which is so thin that heat is distributed unevenly; however, the better irons are satisfactory.

Irons of any kind should be cared for according to the manufacturer's directions. There are several suggestions that apply to all, however. Dropping should be avoided as it is more harmful to irons than is any other hazard. The connecting cord should be replaced at the first sign of wear, and the appliance attachment plugs should be kept in good condition. The sole plate should be clean when used. If the sole plate is soiled it should be wiped off when cool with a damp cloth, or rubbed with soap suds or a mild scouring powder. The iron should never be immersed in water, nor water allowed to seep into the working parts. Occasionally, the sole plate may be polished with paraffin or beeswax.

Good results when ironing are dependent upon other factors in addition to the temperature, the pressure or weight employed, and the shape and size of the ironing surface. These include the amount of dampness in the material being ironed, and the smoothness and amount of padding on the ironing board.

As is seen, the early idea of smoothing out wrinkles was to use heavy weight with whatever heat could be mustered. More recently it has been found that although heat alone will not suffice, contact of heat with a dampened fabric usually has more to do with its effective smoothing than does the heavy weight of the iron employed. Early electric irons weighed from 5.5 to 8 pounds and were heated with a resistance coil using from 400 to 600 watts. More recently irons weighing from 3 to 4.5 pounds are heated with 1,000 to 1,100 watts. These irons heat quickly, maintain ironing temperatures well, and in general are less fatiguing to use than the heavier irons. When the lightweight iron is used in ironing heavy materials, it is important that the fabric be dampened to exactly the proper moisture content. Otherwise the operator must exert a great deal of pressure to remove creases. Very damp fabrics usually require a somewhat longer ironing period. The weight of the iron should be well balanced so that the points will not dig into the material being ironed.

The ironing board should be padded to allow a certain amount of resiliency under the pressure of the iron. The padding should be protected with a removable washable cover, or the fireproof glass or asbestos covers available. The average board is about 54 inches long and 14 inches wide, with one end narrow enough to permit clothing such as dresses and shirts to be slipped on and off readily. Research

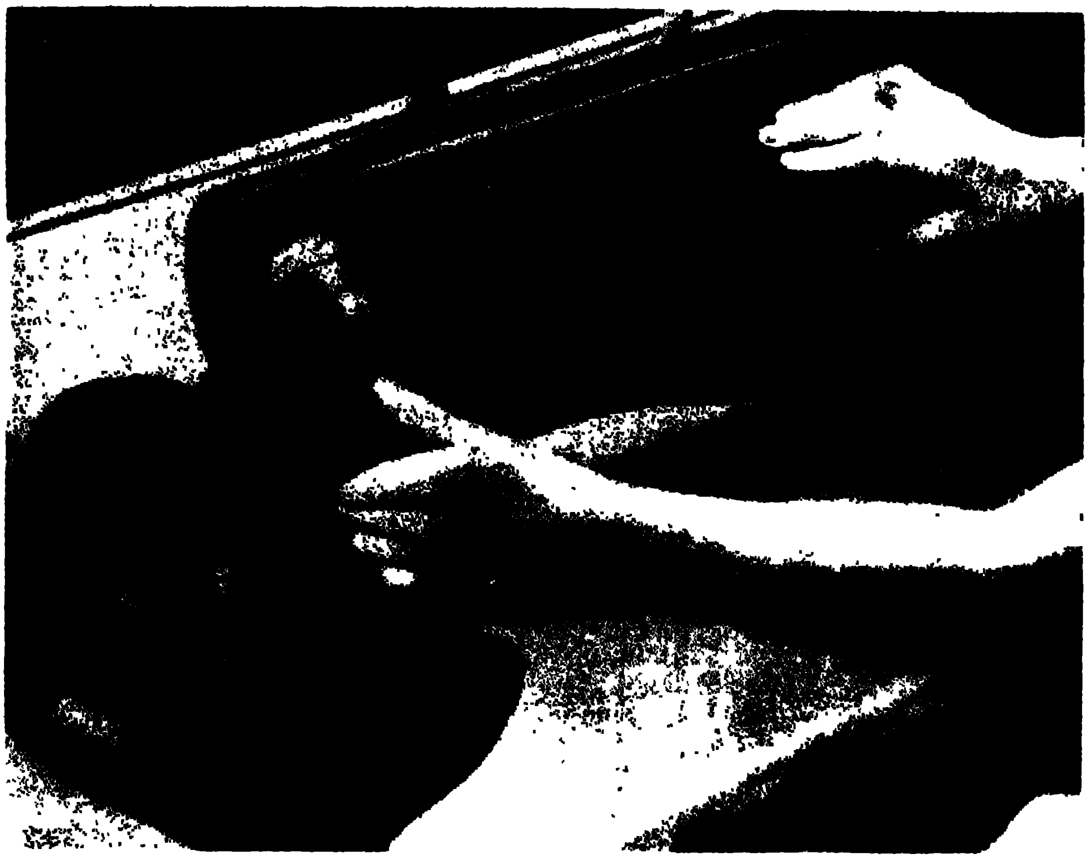
Courtesy Hurley Machine Division

An ironer requires only a small amount of space.

has shown that an ironing board 20 inches wide for ironing shirts and flat goods reduces the energy requirement. A wider board should be available to iron these items in households in which the quantity is great. Folding boards should have a well-supported frame to prevent swaying. The height of the folding board is often adjustable, and should be determined with due regard for the individual using it. A low ironing board which permits the worker to sit on an ordinary kitchen chair while ironing is desired by many. Most ironing boards are made of wood, but a few of perforated metal have been developed. The perforations permit steam to pass through the board, which makes ironing a little faster.

The modern electric ironer has a distinguished line of forebears, tracing back through the centuries to the early days of Rome. The Roman cocheila was a smooth table on which the clothes were laid, and upon which a weighted cover was placed. Hundreds of years later the Dutch improved it by equipping the cover with a turn-screw similar to the letter press. By 1800 the cover had been replaced by rollers that were moved with effort back and forth over the material to be pressed. Later, heated iron cylinders were used, thus combining the heat of the flat iron with the heavy roller-press. Last came the application of electric power, making available a smooth working machine using but little effort of the operator.

Ironing machines or ironers may be divided into the roll and the press board types. In the roll type, a roller of wood or steel padded with several layers of burlap or a heavy outing



Courtesy *Ladies' Home Journal*, Copyright Curtis Publishing Co.

With practice even complicated garments can be ironed on the roll-type ironer.

flannel, and covered with muslin corresponds roughly to the ironing board. It is the surface on which the article to be ironed is stretched into place, and subjected to the smoothing action of the shoe as the ironing agent of heated metal strip is called. The shoe is made of chromium-plated steel, cast iron, steel or aluminum alloy, so that its surface is smooth and rust resisting, and it is heated by electricity or gas.

The roll varies in length from 26 or 28 inches to 42 inches or more. If the roll is of wood it must be well seasoned, lest the wood continue to dry out with time and make the roll irregular in shape. Usually one end of the roll is left open to facilitate the ironing of sleeves, ruffles, and parts of the garments which are not flat. The padding should be replaced occasionally to maintain its resiliency.

The shoe is 4 to 8 inches wide and practically as long as the roll or board. The shoe supports are located centrally or at

Courtesy *Ladies' Home Journal*, Copyright Curtis Publishing Co.

The press-board type of ironer in operation.

each end. An electrically-heated shoe is rated at 1,200 to 1,650 watts. The heating element is frequently flat ribbon wire wound around mica. Some ironers are hotter at the open end of the roll because more ironing is usually done there than in the center of the roll. On some ironers the roll is the movable part and the materials to be ironed may be inserted at the right or the left side. The speed at which the roll turns varies with the ironer. In some cases the speed can be controlled according to the skill of the operator, the dampness of the material to be ironed, or for other reasons. Some machines have a pressing device which stops the roll when desired for pressing.

The switches for the motor, for heating the shoe, and the controls on the roll should be conveniently located and easily accessible. The roller controls are operated by the finger tips, by the knee, or by foot. Some ironers have light indicators by which one can tell whether or not the current is passing through the heating coil.

The press-board type of ironer consists of a padded board and a heated metal shoe of the same size. An article to be ironed is spread on the board, and the hot shoe is pressed onto it manually by levers exerting mechanical force but without producing movement across it. Controls of various kinds are found on the press-board type of ironer. Thermostatic control of the temperature may be provided for the whole surface of the shoe or for each of the ends; the pressure of the shoe may be varied as the material to be ironed requires; and a switch on the shoe may open and close the circuit between the heating element and the electric line.

An ironer is expected to give a smooth, dry, unscorched ironed product with a glossy sheen or not as desired. Various factors contribute to this end. The pressure exerted by the shoe on the roll or board should be uniform except at the extreme ends where it should be more. The pressure exerted by the average shoe is from 100 to 200 pounds. The heat should be so distributed that there will be no excessively hot spots. It is an advantage to have the heat thermostatically controlled. The amount of pressure and the amount of heat are definite influences in the speed of the ironing operation.

Flat work is easily ironed on each of the types of ironers. The ironing of clothing requires experience to develop skill. The process consists of determining the major parts of the garment that may be treated as flat work and the sequence which should be followed, and then in the ironing of the parts in this order. This may require deft manipulation of the controls. Some garments are constructed in such a complicated manner that ironing may be accomplished more quickly and more satisfactorily by a hand iron. In homes in which much ironing of garments is to be done, attention might be given to selecting garments of those designs that are simple and hence lend themselves to ironing on the mechanical ironer.

All moving parts on any ironer should be inclosed. Bearings should be oiled in accordance with the manufacturer's directions. Shoes should be cooled before the machine is stored and the shoe and the roll should be separted. The ironing should be distributed over the entire ironing surface to prevent the pad from packing unevenly and to prevent the shoe from overheating in the unused spots. Ironing over anything hard turned toward the ironing surface should be avoided. Buttons and such trims should face toward the padding.

In summary, the devices commonly used for ironing include sad irons heated externally on a range, gasoline or electric irons, and ironers. The investments involved range from about $3 for a set of sad irons, to over $100 for an ironer. The prices of gasoline irons range from $4 to $8; electric irons range from $3.50 to $12; and ironers may be found from about $35 upward. The larger investment in ironers may be justified by the saving in time and energy for the worker. Although only a few comparative studies have been made, it is known that ironing time can be reduced by approximately one-half when an experienced worker uses an ironer instead of an iron. It is also true that the operator of an ironer usually sits to work, while those who use an iron often stand. Shifting a garment or a household linen on an ironer roll requires but little energy compared to lifting a 5½ to 8-pound iron many times.

The amount and type of ironing should determine the kind of ironing device chosen. Often the buyer may be prevailed upon to make a more expensive purchase than is really needed, or than the family budget should permit. On the other hand, the ironing needs may be such that the higher-priced ironers will be found the cheapest in the long run. In homes in which there are many clothes for children, in which there are unusual requirements for household linens, or in which the responsibility of carrying other seasonal work is great, the task of ironing by hand may be too great a tax on the homemaker's strength. In some cases the use of an ironer conserves so much time and energy that the homemaker is permitted to carry her accustomed duties and also to follow other interests. In other cases a paid worker may be partially or wholly dispensed with. Evaluation of the ironing needs should be carefully considered along with information on the relative quality of irons and ironers before a decision is reached.

Suggested Activities

1. Examine and use some irons. Notice the following about each: trade name; manufacturer; wattage; weight; shape of body; shape of handle in relation to comfort; sole plate—thickness, size; chromium plating—appearance, thickness; temperature control-gradations; cord; other conveniences. What effect do each of these items have on their effective use?
2. What care should be given an iron?
3. Examine and use an ironer. Notice the following points about each: trade name; manufacturer; wattage; number and location of thermostats; number and location of switches; cord; shoe—size, safety, finish; possibilities for convenient arrangement of clothes while ironing, type of cabinet, other conveniences.
4. What care is necessary to keep an ironer in order?
5. Certain circumstances may affect the extent of ironing done on household linen. What can be done to reduce the amount of ironing of these articles: sheets, pillow cases, dish towels, guest towels, bath towels, place doilies, luncheon napkins, dinner napkins, table cloths?

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UNIT SEVEN

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Standards of Quality for Certain Home Furnishings

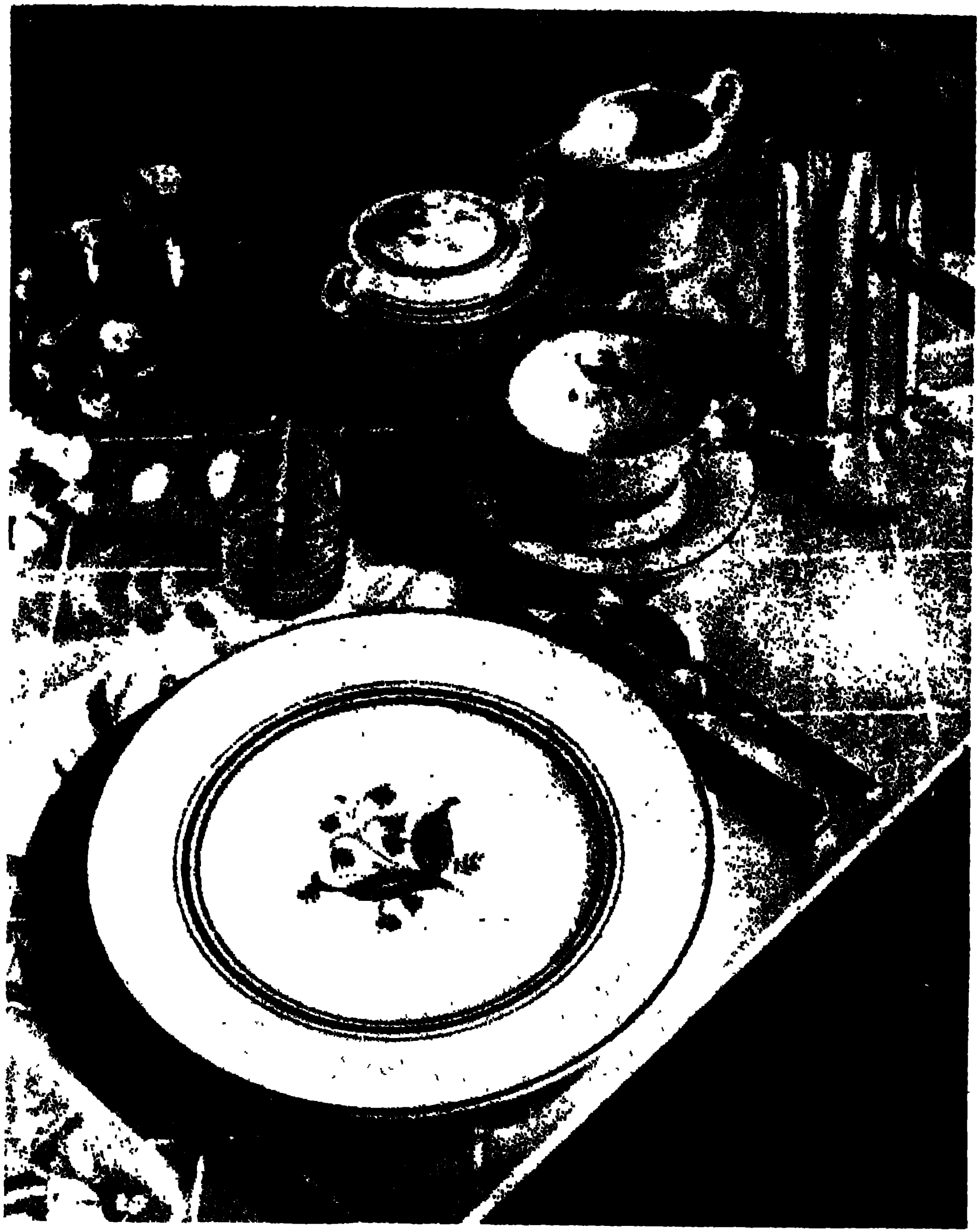
DUE to the known pattern of modern life, it is possible to list certain home furnishings as commonplace essentials in the furnishing of a home. Since meals will be served, there must be china, silverware, glassware, and table linen. In most if not all homes furniture and rugs will be used in the social area, the work area, and the rest area. The furnished apartment remains the exception rather than the rule even in this day of urbanization of the population. In the case of each of the groups of furnishings listed, certain basic considerations should be back of the choice made if it is to provide any lasting satisfaction to the homemakers.

Important in these considerations is the need of the household for these furnishings. The number in the family and their age dispersion, the scale of living which is to be maintained, the available labor to be spent on the upkeep of the furnishings, and the size of the income are, or should be, the major determining factors in the choice of the quantity and quality of those household furnishings commonly regarded as necessities. It is advisable to make a list of all the necessary furnishings and a second list of desired articles not properly to be regarded as necessities.

The purchase price is influenced by the size and number of items included; the material used, the quality of workmanship, the construction, and the finish. Recognizing this, one is better able to decide as to which points, if any, one is willing to make a compromise to bring the proposed expenditure within keeping of the income. Thoughtful consideration of standards of quality should guide one in such a decision.

Problem 1. WHAT SHOULD BE CONSIDERED IN CHOOSING DINNERWARE AND GLASSWARE?

Dinnerware, glassware, and silverware, in addition to serving certain useful purposes, bear much the same relationship to the dining room as certain essential accessories do to a costume. If well chosen they may add to the attractiveness and charm of the room, aid in giving it character, reflect the culture and taste of the owner, and contribute to the satisfaction of the family. Important considerations in making a wise choice in this field are the appropriateness and suitability of the table service selected for use in the specific home. If the articles comprising the table service are not in keeping with the spirit of the home, little satisfaction will attend their use. The home that expresses formal dignity and reasoned regard for ancestral lore seems to require conventional formal table service: gleaming silver hollow ware, an elaborate array of flatware, translucent china, and delicately etched glassware. The simple cottage home or the ranch or farmstead might give an incongruous background for this formal array. The table service for these homes may be wholly satisfying to the families concerned, and yet be comprised of colorful combi-



Courtesy Onondaga Pottery Co.

The dinner service is the most important part of the table setting.

nations of pottery, heavy pressed glassware, and bone- or wood-handled cutlery or flatware in an inexpensive silver plate. If harmonious combinations of the desired quality are chosen, the whole being keyed to the spirit of the home where it is to be used, the selection of the table service will be found to add to the charm and interest of the home. Ways and means of identifying quality in these articles become important in the direction of a wise choice. Price is not a safe criterion of quality, although it is sometimes used as such. Consideration of the unique features of each of the groups of articles included in the table service, then, is of importance to the prospective purchaser.

The dinner service is the most important part of the table setting. It is perhaps best to select it first and then choose glassware, silverware, and linens to harmonize with it. Aside from the quality of the dishes selected, the form, color, texture, and pattern all contribute to their appearance.

The style of the dishes should be in keeping with the setting of the home. Modern shapes are effective in modern surroundings. Certain classical shapes enhance a formal setting, and low "squatty" forms characteristic of peasant pottery are best in the informal environment.

Color may be introduced in the dishes to produce an interesting effect, refined, subtle colors being used for elegant formal service and strong, brilliant colors being used for informal service, with linens of rough textures and possibly unusual shapes. Although skillful handling of color in the dinner service may lend variety and vivacity to a table the main dishes usually have their decoration on a background of white, cream, or off-white, or these may be undecorated except for figures in relief. The choice of this background depends upon the amount of warmth desired and upon the other colors of the table appointments.

The texture of dinnerware depends upon the materials from which the articles are made and upon the methods used in the firing process. Textures of other parts of the table appointments should be in harmony with the texture of the dishes. Fragile dinnerware is associated with delicate glass and fine silver and linen, while heavy dishes demand striking contrasts of form, color, and pattern in these appointments.

Good design demands that the decoration follows the structural lines of the object it adorns; hence designs for dishes are somewhat limited. Whether the desired idea is expressed by naturalistic, conventionalized, or geometric motifs, the design should be governed by the shape of the object and the shape of the background. Consequently designs that really fit into a shape have usually become conventionalized or geometric and are no longer naturalistic. The character expressed in the pattern defines the idea which the dishes give. Formerly it was considered desirable to have all of the dishes in a dinner service of the same pattern. Now, although dinner plates, bread-and-butter plates, and cups and saucers are commonly alike, other dishes used in the service may be different, if discriminatingly chosen in harmonizing colors, textures, patterns, and materials. Dishes having a different pattern and color, or made of a different material may be used for various courses.

Dinnerware is divided into several main types of ware, each made by variations of the same processes and each having varying grades of qualities. These types include pottery, earthenware, semivitreous china, and china or porcelain.

The making of pottery really antedates history. It is usually made from coarsely sieved clays. It is opaque, porous, uneven, and sometimes only partially covered with glaze. It may chip easily.

Earthenware is a refinement of the process of making pottery. Although first developed commercially by the English, who still make fine dishes of earthenware, there is now much American earthenware on the market. Earthenware is opaque, having a porous body and a soft, bright glaze on the outside. It is made of a mixture of clays and other substances which have been fashioned into the desired shapes, then dried, and fired. Following this treatment, each article is coated with a fusible glaze and is further fired at a lower temperature to produce a glossy, nonabsorbent surface. The body and glaze of earthenware may be one of several different kinds including white or ivory covered with a colorless transparent glaze; white or ivory covered with a tinted transparent or semitransparent glaze; tinted bodies covered with colorless transparent or semitransparent glaze; or a white or colored body covered with an opaque, highly colored glaze. Any color in either the body or the glaze is produced by the addition of metal oxides.

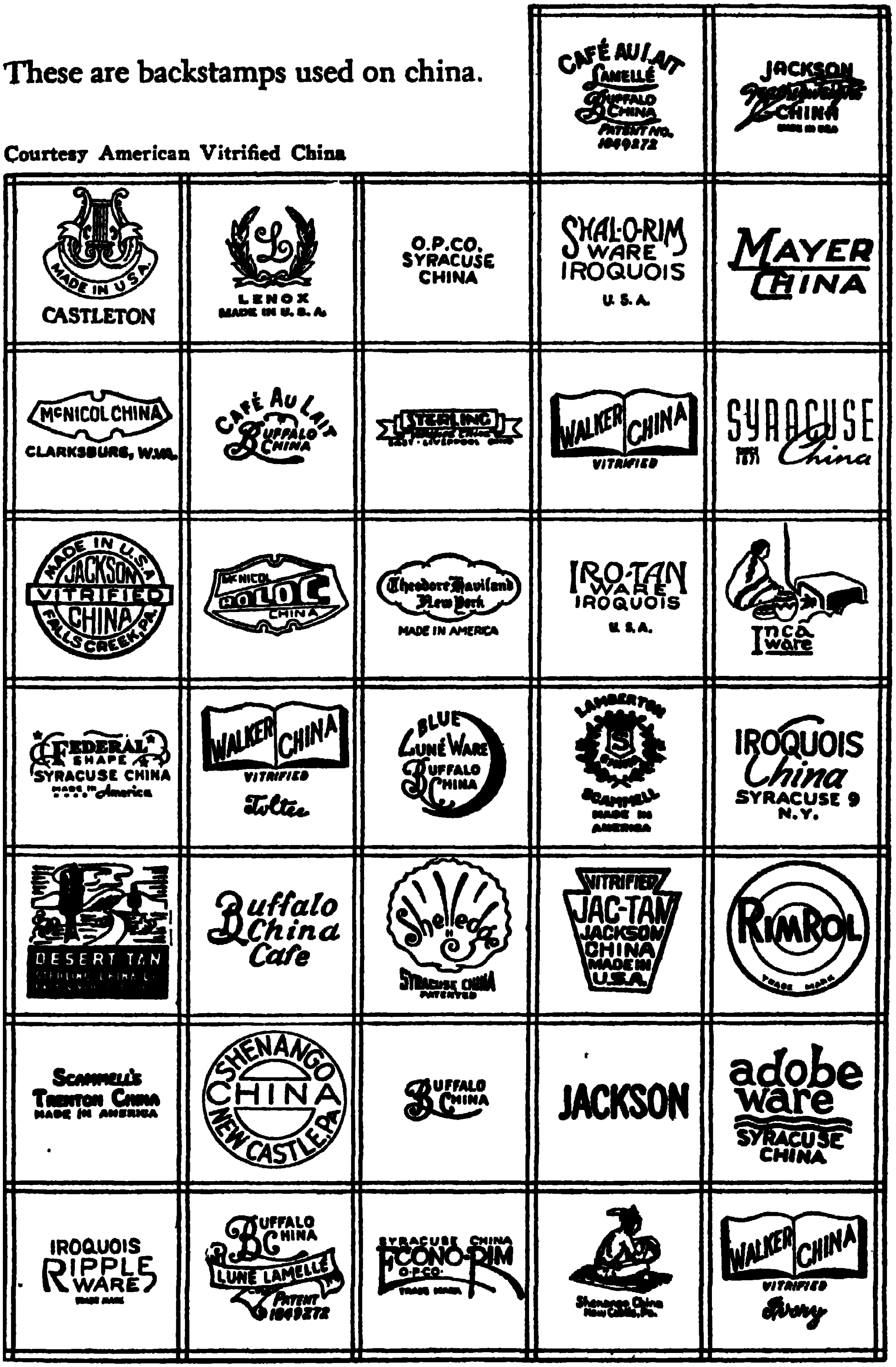
Earthenware is less expensive to produce than either china or porcelain, their higher cost being the result of a greater outlay in the manufacturing processes. Earthenware may be shaped largely by machinery and there is little loss in the biscuit fire from shrinkage or warping. The glaze fire is fairly simple and results in but a few losses. Earthenware is porous, thus facilitating an even absorbtion of the coating of glaze, and the range of temperature in the glazing fire is wide, making possible an acceptable ware with comparatively slight control of temperature. Imperfections that may be observed in earthenware are variations that may occur in the thickness of glaze on the edges and flat parts, warped appearing plates and hollow ware, variations in the color of the decorations, and scars from the pins and stilts on which the article stood during the glazing fire. Earthenware may craze or check in use from uneven expansion of the body and the glaze.

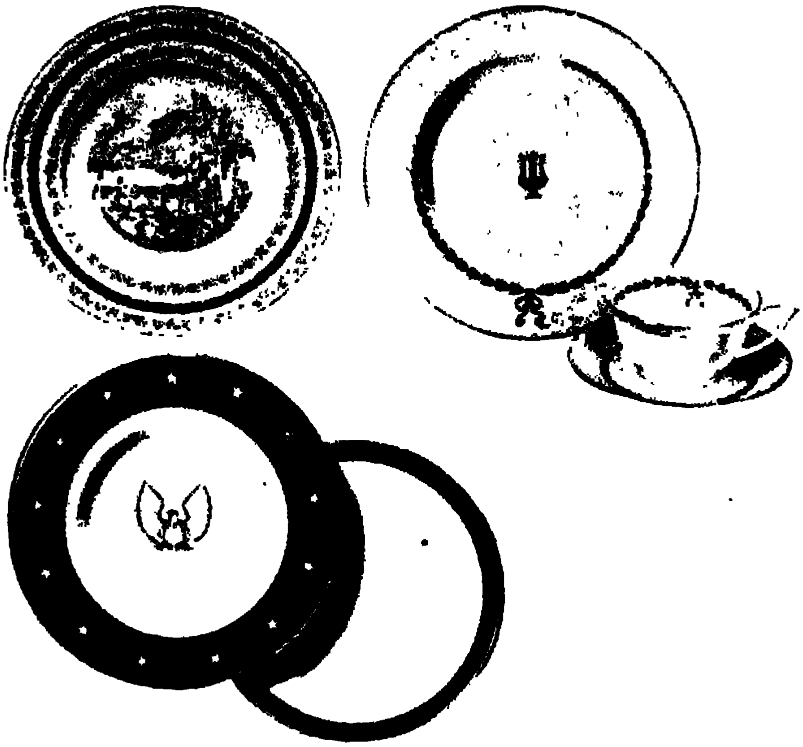
Semivitreous ware is a term applied to a type of dinnerware. It has a quality somewhere near midway between earthenware and china. A higher temperature at the time of firing makes semivitreous ware of harder body than earthenware. This reduces the porosity in the finished ware to about 6 or 8 per cent. Its features are fine texture, a white or ivory color, an absence of a clear ringing sound when struck, and practically no translucency. It tends to chip more easily than either earthenware or china. Semivitreous wares are moderate in price.

The terms, china and porcelain, are often used interchangeably. Technically, each of these is a different product, but the nomenclature concerning them is not uniform throughout the trade in the United States. They are both translucent and vitreous and they are both results of attempts to reproduce the Chinese ware which was brought to England and to the countries of Continental Europe. The term "chinaware," later shortened to "china," was used by the English makers of dinnerware and by their descendants in America to

These are backstamps used on china.

Courtesy American Vitrified China


CAFÉ AU LAIT LAMELLÉ BUFFALO CHINA PATENT NO. 1649272
JACKSON CHINA MADE IN USA
MADE IN U.S.A. CASTLETON
LENOX MADE IN U.S.A.
O.P.CO. SYRACUSE CHINA
SHAL-O-RIM WARE IROQUOIS U.S.A.
MAYER CHINA
McNICOL CHINA CLARKSBURG, W.VA.
CAFÉ AU LAIT BUFFALO CHINA
STERLING EAST LIVERPOOL OHIO
WALKER CHINA VITRIFIED
SYRACUSE SINCE 1871 China
MADE IN U.S.A. JACKSON VITRIFIED CHINA FALLS CREEK, PA.
McNICOL CHINA
Theodore Haviland New York MADE IN AMERICA
IRO-TAN WARE IROQUOIS U.S.A.
Inca ware
FEDERAL SHAPE SYRACUSE CHINA MADE IN America
WALKER CHINA VITRIFIED Toltec
BLUE LUNÉ WARE BUFFALO CHINA
LAMBERTON SCAMMELL MADE IN AMERICA
IROQUOIS China SYRACUSE 9 N.Y.
DESERT TAN STERLING CHINA
Buffalo China Cafe
Shelledge SYRACUSE CHINA PATENTED
VITRIFIED JAC-TAN JACKSON CHINA MADE IN U.S.A.
RIMROL TRADE MARK
SCAMMELL'S TRENTON CHINA MADE IN AMERICA
SHENANGO CHINA NEW CASTLE PA
BUFFALO CHINA
JACKSON
adobe ware SYRACUSE CHINA
IROQUOIS RIPPLE WARE TRADE MARK
BUFFALO CHINA LUNE LAMELLE PATENT 1649272
SYRACUSE CHINA ECONO-RIM O.P.CO. TRADE MARK
Shenango China New Castle, Pa.
WALKER CHINA VITRIFIED Ivory

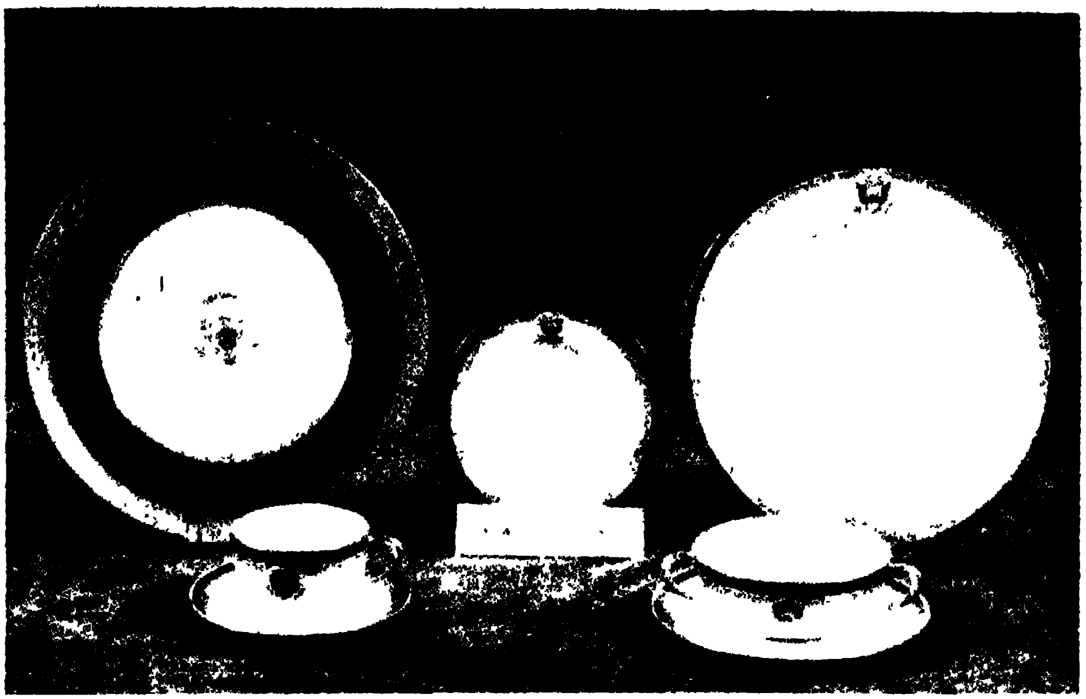


Here are designs to suit your taste.

designate any dinnerware that is vitreous and translucent.

China, however, is really a modification of earthenware and is made by the earthenware process, although the composition is different. The base materials of all china are a body clay and a fusible silicate that melts at a high temperature, about 2200° F., and holds the particles of clay in suspension, producing translucency. The body is first fired at a relatively high temperature which vitrifies it, thereby making it practically impermeable. It is then covered with a prepared glaze usually plumbiferous, and finally subjected to a second fire of considerably lower temperature which vitrifies the glaze and fuses it on the body.

English china is of three kinds, Bone china, Jasper, and Irish Bellek. Bone china contains around 37 per cent of calcined cattle bone, which makes the clay mixture more fusible, cuts down shrinkage, and gives the finished product a high degree of translucency and a brilliantly white color. This ware is tough and durable. Jasper china is the Wedgewood which is renowned for its seals and relief figures in color. Irish Bellek china is sometimes known as "egg shell china" because of its highly translucent, cream-colored body with a soft, irri-

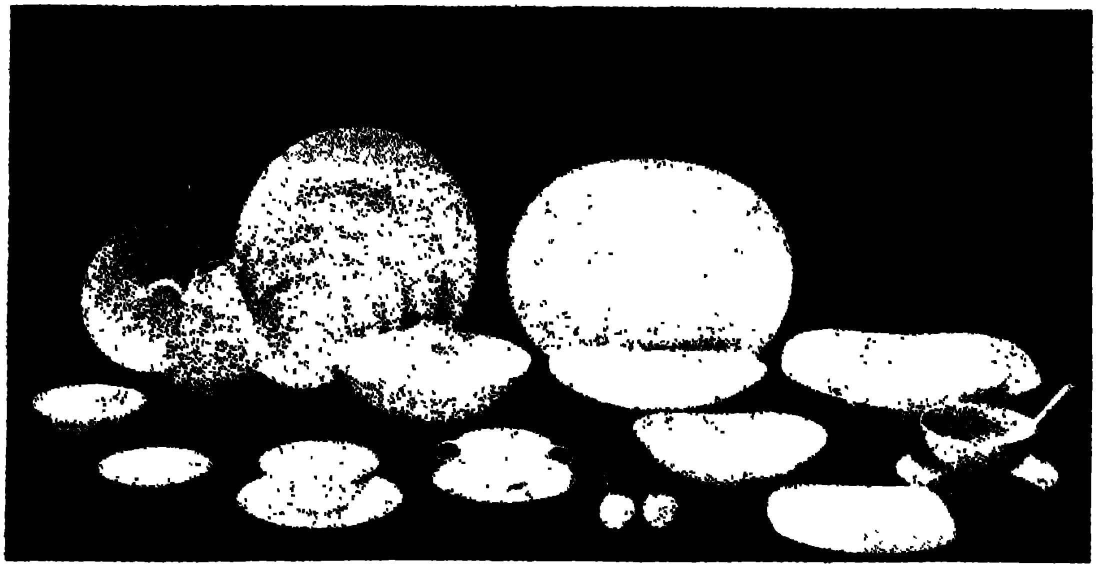


This is the dinner-ware used at the White House.

descent glaze and its extreme thinness. These properties are produced by a blend of flint, feldspar, and potash.

American china includes American Hotel china and American Bellek china. American Hotel china combines the good qualities of the porcelain of Europe and those of the china of England. It has unusual resistance to shock and it resists scratching to a remarkable degree. It is made in three thicknesses: double thick withstands the hardest use but is unattractive for household use; single thick-rolled edge has a thinner cross-section but is thickened at the edge to resist chipping; and the single thick is similar to the same weight in imported wares of porcelain and china. American Bellek china has a tough body but a soft glaze which limits its use to those situations where great care will reduce scratching to the minimum. Because of the high cost of production it is an expensive ware.

The imperfections of china are due to faults during the processes of manufacture. Slightly higher temperature during the firing of either the biscuit or glaze results in excessive warpage or shrinkage. In addition, scars from pins and stilts



Courtesy Castleton China Company, the Museum of Modern Art, and Walter Civardi of Pratt Institute

Dishes of modern shapes are effective in modern surroundings.

may appear in the glaze on the underside, owing to carelessness in handling during the glaze firing.

Porcelain ware is a vitreous, translucent dinnerware with a hard glaze. The body of this ware is baked only to a hardness sufficient to prevent its softening when coated with the liquid glaze. The firing of the glazed ware is then accomplished at such a high temperature that the body and glaze are matured simultaneously, thus fusing them together while developing vitrification and translucency. This process is also instrumental in preventing crazing as a result of heat shock. Any chip on the edge of true porcelain reveals the hard white nonporous body beneath. Porcelain dinnerware is expensive because of high production costs resulting from the need for individual attention and the requirement of a large amount of space for each piece when preparing for firing. It is not commonly manufactured in America and its high cost prevents its use except for the most elegant tables.

Dinnerware may be decorated by two methods. The decoration may be structural in the body of the piece itself or it may be applied in color or gold.

When the decoration is structural it is called decoration in the white and the processes are perfected before glazing occurs. The processes may consist of engravings, embossing, ap-

Courtesy Castleton China Company, the Museum of Modern Art, and Walter Civardi of Pratt Institute

A beautiful shape may be the best decoration.

plied relief, or perforations. *Engraving* is carved into the body before it is fired. When patterns are *embossed* in low relief they are formed in molds. If higher *relief* is desired the pattern is produced by painting the clay of the body with a thick fluid called "slip." This material is also used to fasten on handles. Sometimes a white slip is applied after glazing, which necessitates a second glazing and firing. *Perforations* may be cut through the edge of plate rims or fruit baskets and may make an interesting design.

Colored decorations may be underglaze or overglaze decorations. *Underglaze* decorations are durable because they are applied on the surface of the unglazed ware. Following this the decoration is either baked or fired, followed by applying and firing the glaze. When *overglaze* decorations are used the colors are applied to the surface of the glazed ware and are then fused into the surface of the glaze by a moderate decorating fire. If carefully done the decoration will be durable and not subject to undue abrasion. Overglaze can be detected by a slight roughness when rubbed with the finger or by catching its dullness in the light.

The decoration itself may be accomplished by the use of one of three different processes. In one, *decalcomania,* a transfer picture is printed with vitrifiable colors on a pre-

Courtesy Onondaga Pottery Co.

Underglaze decorations are durable because they are applied on the surface of the unglazed ware.

pared paper and transferred from the paper to the piece to be decorated. It may be used either as an overglaze or as an underglaze decoration. This is the cheapest process, but it is attractive and durable if a good pattern is chosen and if it is carefully done. Underfiring produces dull colors and overfiring produces faded colors. In another process, a single vitrifiable color is printed on paper from copper plates. It is then transferred to the dish in the same manner as the decalcomania. This is an overglaze print. A third choice of process to decorate dinnerware is by hand china-painting. This is the work of artists and the cost is high.

Gold decoration is an overglaze decoration. It may be coin gold which is pure, finely divided gold, suspended in a heavy oil and applied with a brush. After heating it is polished to bring out its luster. Its durability is dependent upon the thickness of the layer. Another method of gold decoration is called liquid bright or luster gold. This is a preparation which contains only a small amount of gold and which produces a bright gold surface without polishing. It is used only on the lower qualities of dinnerware, and it will wear off eventually.

The amount of money available for dinnerware, the type of meal service desired and the number of persons for whom dinnerware must be provided are all factors in the choice of the type of dinnerware. If the scale of living is such that elegance and formality are desired the finer grades of porcelain and china are suitable. However, for the more modest scale of living, less expensive materials and grades give excellent service. The size of the family and the amount of entertaining obviously affect the number of dishes necessary in the dinner set. If the budget is restricted the choice must be made between a limited number of high quality dishes and a more generous quantity of a lower quality.

It is difficult for the buyer of dinnerware to determine the quality offered. There is but slight regulation of stamping and no uniformity in grading within the industry. The different manufacturers have their own standards for the degree of perfection demanded in each of their grades. The buyer must therefore depend on his own judgment or the reliability of the retailer. Most reputable dealers do not handle the lower grades except for sale or bargain-counter purposes. The following grades are those commonly used by manufacturers to denote qualities: [1]

Selects, perfect products so far as careful inspection will disclose.
First Grade, all ware which appears perfect on a less critical inspection.
Second Grade, ware with minor defects which are not readily detected by the casual observer.
Third Grade, ware displaying blemishes which are readily detected but which do not injure the article for service although they detract from its appearance.
Culls or *Lump,* ware which is chipped, badly warped, scarred in making or firing, or on which the decoration is seriously faulty.

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[1] Arthur S. Watts, *The Selection of Dinnerware for the Home.* The Engineering Experiment Station Circular 21, Ohio State University Studies, 1930.

Some manufacturers divide their product into:

R.K. (run of kiln), including all selects, first grade, and better ware of the second grade.

Second Grade, including the poorer ware of the second grade, and the third grade ware.

Culls or *Lump,* as in the previous classification.

Although complete sets of dishes are less commonly used than formerly, the very expensive ware and the very cheap ware are still offered in closed stock. It is sometimes advised that the average homemaker buy from an open or stock pattern which insures that additional pieces or replacements may be obtained as long as the pattern is made. The length of time that an "open pattern" is available, however, affords far less protection than is commonly supposed, as each year many new patterns and shapes are introduced.

A dinner service is usually purchased in numbers sufficient to serve four, six, eight, or twelve persons. Eight is a popular number because it will accommodate the average size family and also because it will serve two tables at a game of cards. For a modest service the following pieces would seem adequate:

8 dinner or luncheon plates
16 small plates
8 fruit dishes
8 cereal dishes
8 cups and saucers
1 sugar bowl
1 cream pitcher
1 set salt and pepper shakers
1 large meat platter
1 small meat platter
3 vegetable dishes
1 jelly dish
1 pickle or relish dish
1 coffee- or teapot
1 butter plate

The cereal dishes in this group may be used for serving soup. The small plates may serve for salad, for bread and butter, or for dessert. Unless the silver set includes individual butter spreaders the bread-and-butter plate is not commonly used, so it is unlikely that two would be used in the same course.

If a more generous and formal allotment of dishes is desired the following amount for twelve people should meet their needs:

12 service plates
12 dinner plates
12 luncheon plates
12 soup plates
12 salad plates
12 bread-and-butter plates
12 dessert plates
1 sugar bowl
1 cream pitcher
1 jelly dish
1 pickle or relish dish
1 coffee service
1 tea service
12 fruit dishes
12 cereal dishes
12 coffee or tea cups and saucers
12 after-dinner coffee cups and saucers
1 large meat platter
1 small meat platter
1 covered vegetable dish
2 open vegetables dishes

Where circumstances and desire demand it, 12 each of bouillon cups, oyster plates, and game plates may be added, along with a large cake plate, a chop plate, a salad bowl, and other less frequently used items.

For the sake of variety, or to prevent the breakage or chipping to which everyday use subjects dinnerware, some homemakers prefer a second smaller and less costly set of dishes. This set is used for most meals and contains only enough pieces for serving the family and one or two casual guests.

Pitchers for water, milk and cream, and other beverages may be made of the same ware as the dinner set, or of glass, silver, pewter, or chromium. Pitchers may add a distinct decorative note to the table, but they should also function efficiently for the purpose for which they were designed. No matter how beautiful a pitcher is, if it cannot be used in pouring without disaster from liquid dripping to the table linen, it is likely to be relegated to a shelf. When choosing a pouring utensil it is well to see it tested by seeing water poured from its spout. In addition to this test, attention to a few points on the construction of the spout and other parts of the vessel should help in securing a dripless utensil. The following points are offered for guidance in the choice of pitchers.[1]

1. The edge of the spout should be sharp and thin.
2. The tip of the spout should be at such a sharp angle as to

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[1] Adapted from unpublished research by Margaret Whittemore and Blanche M. Kuschke of the Agricultural Experiment Station of Rhode Island State College.

Courtesy Rhode Island Agricultural Experiment Station

Attention to the construction of the spout and other parts of the pouring vessel should help in securing a dripless utensil. *Upper*: The tip of the spout should be at such a sharp angle as to direct the last of the liquid being poured either sharply away from the utensil, or back into it. *Lower*: To aid in emptying the vessel the spout should begin low in the vessel. It should also be free from bulges below the point at which the spout begins. Deficiencies of pitchers in these respects are common.

direct the last of the liquid being poured either sharply away from the utensil, or back into it.

3. A smooth glossy surface which reduces adhesion between the liquid and the utensil at the spout reduces the spread of the liquid and encourages more rapid cut-off of the stream.
4. The sides of the nose or spout should be slanted to direct the liquid into the center of the pouring stream.
5. To aid in emptying the vessel the spout should begin low in the vessel, or a groove from near the bottom should lead up to it. The vessel should also be free from bulges below the point from which the spout starts.

Dinnerware of any kind may be damaged by careless handling. Traditionally, china as used in the household is regarded as a fragile and precious article and handled as such, and yet great damage is often done. Breakage and damage to appearance are matters of poor handling. A frequent cause is found in poorly organized methods of handling and storing ware. Two pieces should not be struck together with a sharp blow nor should they be scraped against each other when stacking or drying. Dinnerware having overglaze decorations requires special precautions in this regard. Fine plates should have pads placed between them when stacked so that the foot of one will not scratch the face of the other.

Plates of similar size should be stacked together. When plates are stacked too high, heavy pressures are exerted, so the height of the pile should be restricted. No hard or sharp object should ever be used to scrape food from dishes. If possible, avoid the nesting of cups in constant use. Cups may be kept in a drawer with handles interlaced or placed on a narrow shelf at the back or side of the cupboard between two regular shelves. Gold on handles wears most quickly at the base, and placing cups inside one another hastens this wear.

When washing dishes use plenty of hot water and suds made from mild soaps. If water is hard, mild water softeners as borax, washing soda, or trisodium phosphate are an aid. Change the water as often as it becomes soiled and rinse in plenty of hot water. A towel or rubber mat laid on the drain board and in the bottom of the dish pan will help protect fine dishes. When possible the water faucets should be turned away from the space over the sink. If the faucets are stationary the tips should be furnished with a rubber cover.

Dishes are sometimes discolored by overheating. Fat or other food may be burnt on or penetrate under small cracks in the glaze. Usually when warming on an oven it is desirable to place a fibre pad on the oven. Tea and coffee that is allowed to dry on cups may leave a stain which is difficult to remove. Baking soda rubbed gently on the stain is usually effective in removing it.

The glassware should be selected to harmonize in elegance or simplicity, weight and texture with the other table appointments. As a rule glassware derives its interest from shape and color, often augmented by pattern and texture. Styles in glassware change so frequently that except for the most formal use, it is perhaps wise to invest in a comparatively inexpensive ware.

Quality in glassware is dependent on certain characteristics, such as brilliance, clarity, hardness, smoothness, and color. These are determined by the nature and quality of the compounds of which the glass is made. The principal ingredients are silica in the form of sand, some basic oxide such as lead, and alkalis such as soda, potash, and lime. In addition some

Courtesy Fostoria Glass Co.

An etched pattern being touched up by hand. This is the eighth hand process to be done.

other materials may be added to facilitate melting together, to color, or to decolor. These materials include oxides of iron, copper, cobalt, nickel, manganese, and others. Gold is used to produce a fine red color.

Good lead glass used for fine tableware contains from 17 to 33 per cent lead oxide. It is more expensive than lime glass, and it is also more brilliant and tough. Lime glass of good quality contains from 7 to 9 per cent of calcium and magnesium oxides. Unless it is carefully annealed it produces a brittle glass.

Flint and rock crystal may be used to make a brilliant hard glass which can be cut to produce an interesting and sparkling

Courtesy Fostoria Glass Co.

Decorating glassware by etching involves many hand processes. This is the first of several such processes.

design. Usually, common glassware is lime glass or lead glass.

Molten glass is shaped into glassware by blowing, by pressing it into molds, or by a combination of these two processes. Further steps include the beveling of edges, the sticking or drawing of stems and handles, annealing, and fire or acid polishing. Glassware may be decorated by etching, sand blasting, cutting, painting, or by the pressing of patterns during the manufacturing process.

The amount of glassware needed depends upon the number possible to accommodate by the other parts of the service, that is, it should be in proportion to the silver and dinnerware sets. The basic needs may be met by:

Water glasses—8- to 10-ounce size
Iced-tea glasses—12- to 14-ounce size
Orange-juice or cocktail glasses—4- to 5-ounce size
Sherbet or fruit cocktail glasses

These items should be in the same number as the silver and dinnerware sets, with possible exception of the water glasses. If the family enjoys milk as a beverage, the water glasses should be twice the number of the other glasses. Other desirable pieces include bowls, service plates, dessert plates, creamers, and sugar bowls. Wine and cocktail glasses may be added as wanted. Water glasses may be plain tumblers, footed tumblers, or goblets, depending upon the amount available to spend and the degree of formality desired. Squatty, oval, or V-shaped tumblers with a firm base are attractive and are so much more substantial than the tall goblets that they are to a large extent supplanting them. Dessert glasses may have stems or they may range in shape from cups to shallow dishes. Glass plates and odd pieces may match the design of the glasses or they may merely harmonize in color, pattern, or texture.

Fine glassware must be handled with care. Breakage or chipping is apt to occur as the result of sharp blows or quick changes of temperature. Precautions similar to those practiced when handling fine dinnerware are in order. A high sparkle is obtained if glassware is dried without rinsing off the soap suds.

Suggested Activities

1. What brands of dishes used for dinnerware are available on the local market? Are the dishes represented in these brands, classified as pottery, earthenware, semivitreous ware, china, or porcelain?
2. How much would it cost to purchase a set of dinnerware in the size and quality you would desire?
3. Is an "everyday set" of dinnerware desirable? Why?

4. What brands of glassware are available on the local market? Are lead, lime, or rock crystal available in each brand?
5. How much would it cost to supply glassware in the amounts and quality you desire?

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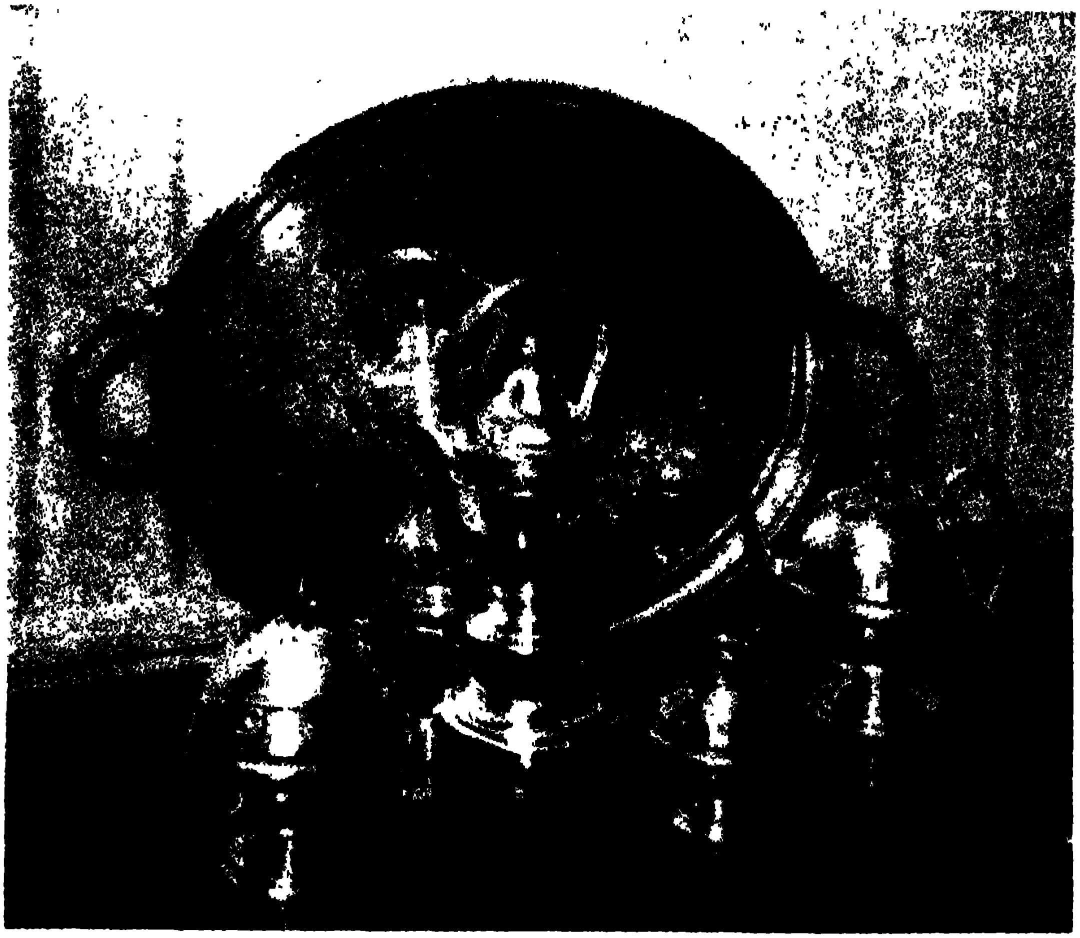
Problem 2. BY WHAT STANDARDS SHALL SILVERWARE BE CHOSEN?

There are two types of silverware which may be used in the home: flatware, which includes knives, forks, and spoons; and hollow ware, which includes coffeepots, teapots, platters, serving dishes, bowls, and pitchers. Both flatware and hollow ware may be purchased in either sterling silver or silver plate, and many devious arguments are advanced to direct the purchaser's choice in this matter. As a matter of fact, the decision will depend somewhat on the relative satisfaction the individual derives from possessing and using sterling or plate, but most largely upon the amount of money the budget allots for the purchase of silverware. Certainly, for the large proportion of the people in the United States whose income is below the so-



Courtesy Daniel R. Merrill

Collecting quaint and beautiful silverware may be one way that a family expresses itself.

called "comfort level," the expenditure of savings for sterling might well be questioned. Furthermore, sterling is soft and requires constant attention to keep it looking well, and there is always the danger of considerable loss if it should be stolen. Plated silver looks well and does not give the feeling of being too good to use daily and is less expensive than sterling.

Some of the large silverware companies manufacture both sterling silver and silver-plated ware; others confine production to one or the other of these types. All large companies produce a complete line of both flatware and hollow ware. The small companies usually produce either sterling silver or silver-plated ware, and hollow ware and novelties.

Pure silver is too soft to withstand constant usage. Before the year 1300, it was discovered that the addition of a small amount of copper increased the durability of silver without changing its color appreciably. Modern science has failed to improve upon this alloy, and the laws of each country control the amount of each of these metals in its sterling. Hence, it is important to know that in the United States the fineness of sterling silver is established, by Federal law, as 925 parts of silver to every 75 parts of copper. The value of any particular piece depends upon the quality of workmanship required for its pattern, and upon its weight. The staple pieces come in two or three weights. The Bureau of Standards recommends that teaspoons be made in three weights as follows: [1]

Teaspoons, trade (to be stamped with letter "T"), 8 ounce
Teaspoons, regular (to be stamped with letter "R"), 10 ounce
Teaspoons, heavy (to be stamped with letter "H"), 12 ounce

Dessert spoons, tablespoons, dessert forks, and dinner forks are recommended to be made in two weights but terminology has not been standardized for them.

Some manufacturers produce each pattern in all weights; others produce a given pattern in two or three weights, while still others produce a pattern in one weight only, but vary the weight for a given piece with different patterns. The practice of producing flatware in a variety of weights may necessitate additional dies for casting the pattern. It does, however, enable consumers having different levels of purchasing power to choose an identical pattern.

It is also well to know that it is the practice for a manufacturer to market a new pattern once every two years. Usually the pattern is continued as long as there is popular demand for it, but a manufacturer will not supply pieces in a pattern after it has been discontinued five years. Therefore a purchaser should investigate the length of time which the pattern chosen has been marketed, lest she be unable to collect all of the needed pieces before the pattern is discontinued. Leading jewelers in large cities carry as many as 30 or 40 patterns in flatware in stock. Others carry a more limited line, but in nor-

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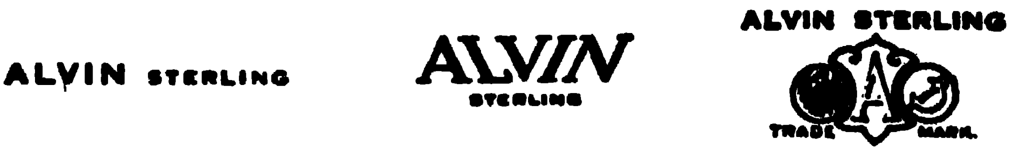
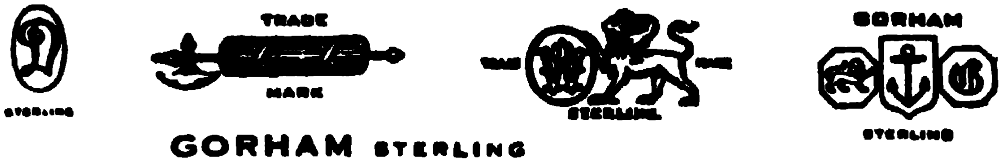
[1] *Sterling Silver Flatware,* p. 1. Bureau of Standards, Simplified Practice Recommendation 54, U. S. Department of Commerce, 1926.

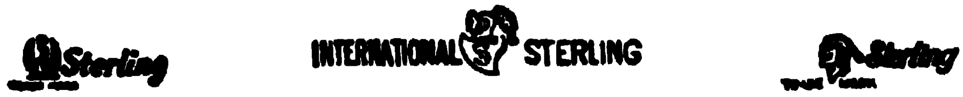
THE ALVIN CORPORATION



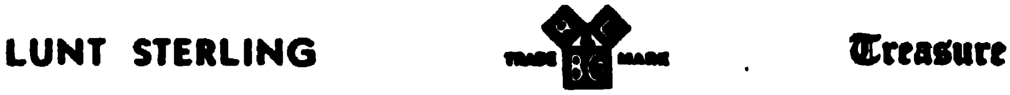
THE GORHAM COMPANY



INTERNATIONAL SILVER COMPANY

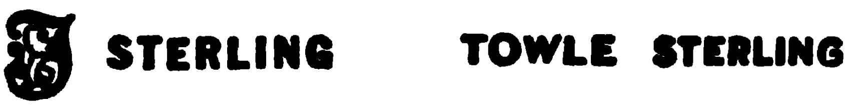


LUNT SILVERSMITHS



REED & BARTON

THE TOWLE SILVERSMITHS



R. WALLACE & SONS MFG. CO.

Courtesy Sterling Silversmiths Guild of America

These are backstamps used on sterling silver.

mal times can fill orders for a desired pattern on short notice. Before World War II there were 1,300 sterling silver flatware patterns of domestic manufacture, including obsolete and inactive patterns. Of that total, 346 patterns were active, and of these 35 or 40 were considered successful from the standpoint of sales volume.

Although coin silver is not used regularly for the manufacture of household articles, its content is regulated under the National Stamping Law. Coin silver articles in the United States are required to contain 900 parts pure silver to every 100 parts of copper.

Silver-plated ware is the term applied to articles composed of a base metal upon the surface of which there is deposited a layer or plating of silver. It may be deposited there by a chemical or electrical process, or it may be applied by brazing, soldering, or other mechanical means. Sheffield plate, originally made in Sheffield, England, was made by the latter process. Modern silver-plated ware is often referred to as electroplated silverware because of the method of plating employed.

Jewelry and department stores, gift shops, and chain stores are the principal channels of distribution for silver-plated ware. Substantial quantities of high-grade, silver-plated ware are sold direct to hotels and restaurants, and large amounts of low-grade ware are distributed to the public as premiums in various advertising contests. Mail order houses, hardware and furniture stores are also distributors of silver-plated ware.

Plated silverware has as its basic form blanks of nickel, silver, copper, or britannia metal strong enough to enable the article to hold its shape under the wear and tear that characterizes its common use. Flatware blanks are stamped, graded, and rolled into the size of forks and spoons. They are then placed in presses that shape the fork tines and the bowls of the spoons. The pattern die is then applied after which the edges are trimmed and smoothed and the articles are cleaned and polished, in final preparation for the plating process.

The blanks for knives may be of all stainless steel, or of a stainless steel blade welded in a nickel silver hollow handle or in a solid handle of some noncorrosive alloy. The knife handle is the only part of it to be plated. The plating of the blanks is done by an electrolytic process. Bars of silver are placed in the plating tank in which the polished blanks are suspended in a carefully prepared solution. An electric current is used to cause the silver to pass from the bars to be deposited on the blanks. The degree of plating depends upon the length of time of the process and the strength of the electric current.

The quality in silver-plated articles is due mainly to the type of base metal used, the quantity and uniformity of silver deposited on the blank, the reinforcement with additional silver of those parts receiving most wear, and the quality of workmanship employed. No national law compels the marking of these products. The consumer, therefore, is unable to determine, except from outward appearance, the quality of the silver-plated ware he buys; consequently he must rely on the reputation of the manufacturer or on the integrity of the retailer. Certain standards, however, as to the quantity of silver deposited on silver-plated ware are generally recognized in trade. These standards as applied to teaspoons are given below. The same requirements pertain to other flat pieces in like proportions.

Standard or Grade	Number of Ounces of Pure[1] Silver per Gross of Teaspoons
"AI" or "Standard"	2
"AI" or "Extra"	2 plus overlay or 2½ no overlay
"AA"	3
"Double" or "XX"	4
"Triple" or "XXX"	6
"Quadruple" or "XXXX"	8
F.S.B. (Federal Specifications Board)	9

Marks used to designate the type of base metal blank used in fabricating silver-plated articles may include:

E.P.N.S.—electroplated on nickel silver
E.P.C. —electroplated on copper
E.P.W. —electroplated on white or britannia metal.

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[1] United States Tariff Commission, *Silverware Solid and Plated.* Report No. 139, Second Series, p. 51, U. S. Government Printing Office, Washington, 1940.

In addition, silverware may be marked "Overlay," "Overlaid," "Sectional," "Spot Plate," or "Reinforced," if there is an extra deposit of silver at the heel or base of the bowl in a spoon or at the base of the tines of the fork.

The number of active patterns produced by a given manufacturer of silver-plated ware is usually less than the number produced by a manufacturer of sterling ware, and ranges from eight to 30.

A few kinds of flatware other than silver are made. Bone, wooden, or composition handles on flatware are interesting when used with heavy pottery or wooden dishes. German silver, an alloy composed of nickel, copper, and zinc, is generally used as the base metal on which silver is plated, but it may be offered for sale unplated. Some other metals, such as chromium or nickel, are used to plate inexpensve flatware.

Grades for silver-plated hollow ware are indicated by the amount of silver deposited on each square foot of exposed surface, measured in pennyweights. The durability of the lower grades is such as to make the purchase of such ware a matter of dubious wisdom.

GRADES OF SILVER PLATED HOLLOW WARE

Grade	Pennyweights Per Square Foot of Exposed Surface
Superfine	No less than 8
Triple Plate	No less than 6
Double Plate	No less than 4
Single Plate	No less than 2
Fractional Plate	Anything less than Single Plate

Silverware of all kinds has three standard finishes:

1. *Bright finish*—Highly polished on a fast-moving cotton buff-wheel, producing a mirror-like effect.
2. *Grey finish*—A dull finish, especially effective on ornate designs, where contrasts of light and dark are desired. It is produced by rubbing on a slow-moving cotton buff-wheel coated with fine pumice.
3. *Butler finish*—This duplicates the mellow sheen produced by years of cleaning and polishing by the butler's hand. It is pro-

duced by first buffing the piece bright and then dulling it slightly on a wire brush wheel with fine pumice.

Originally all ornamentation on silver was executed by hand. Nowadays much of it is done by machinery, although some must still be the result of handwork. A few of the terms used in ornamentation follow:

Repoussé—A pattern on thin metal beaten or pressed up from the reverse side.
Chasing—A pattern impressed on the surface of metal by tapping small steel punches.
Engraving—The ornament is cut on the surface with a sharp tool.
Etching—The ornament is applied by chemicals that eat away the surface.
Oxidizing—A material such as sulphur is used to stain around the ornament to bring out the beauty of the design.
Embossing—The term used to produce any of the above effects by means of steel dies.

Flatware is sold in sets or in open stock. Sets may accommodate 4, 6, 8, or 12 covers at the table. In addition, odd pieces or an extra number of the staple pieces may be desired. It is no longer considered necessary to use only one pattern in silver. It is perhaps better for the more staple pieces to be alike, but spoons or odd pieces may be different yet harmonious in scale and in pattern. For a small family of modest means a service for eight with the following pieces seems desirable:

SILVER SERVICE FOR EIGHT

8 dinner knives
8 dinner forks
8 dessert forks
16 teaspoons
8 dessert spoons
3 tablespoons
1 sugar shell
1 gravy ladle
1 jelly server
1 butter knife
1 cold meat fork
1 carving set

If a more generous allowance for silver is possible, the following set might be desirable:

SILVER SERVICE FOR TWELVE

12 dinner knives
12 dinner forks
12 dessert forks
12 salad forks
12 dessert spoons
24 teaspoons
12 iced teaspoons
12 soup spoons
12 bread-and-butter spreaders
4 tablespoons
1 carving set
1 sugar tongs
1 sugar shell
1 gravy ladle
1 jelly server
1 cold meat fork
1 tomato server
1 ice tongs

It is suggested that the dessert forks mentioned in the two sets above be used for breakfast use. Also the dessert spoons may be used for serving cereal.

In some cases these and other pieces may be desired in addition:

12 coffee spoons
12 oyster forks
12 fruit knives

Dishes and pitchers of silver hollow ware are always acceptable accessories if the budget permits. If expenditures are limited, articles of pewter, glass, china, or porcelain of the same or harmonizing materials as the dinner set may be used effectively.

All silverware must be used in order to develop and maintain a beautiful luster. Tarnish is caused by a sulphide which is often found in the air and is always present in egg yolks. Seldom used silverware should be cleaned and polished thoroughly and then stored in a tarnish-proof chest or wrapped airtight.

Silverware in everyday use should be treated carefully to preserve its beauty. Never use the tableware in the kitchen for stirring or other uses. Careless handling, as in loosely gathering up several different pieces in the hands or throwing them loosely into a drawer may cause dents, nicks, and bends. Silverware should be washed after each use with mild soap suds, using care not to immerse hollow handled knives in hot water either for rinsing or for polishing. Tarnish on silverware having a plain pattern may be removed by electrolysis. If the beauty of the piece depends on the oxidation around the pattern, mild abrasives, a chamois, or a chemically treated cloth are the proper materials to be used to remove tarnish and brighten the surface, as electrolysis removes the oxidation as well as the tarnish. Silverware should be sorted, stacked as to kind, and stored in a partitioned drawer.

Suggested Activities

1. What brands of sterling and silver-plated flatware are offered for sale in your community? What weights or grades are available?
2. How much is the cost of the kind of silverware you would approve in the amounts you desire?
3. What hollow ware do you regard as important to own? What is its cost? Why is it necessary to you? What substitutes could you make?

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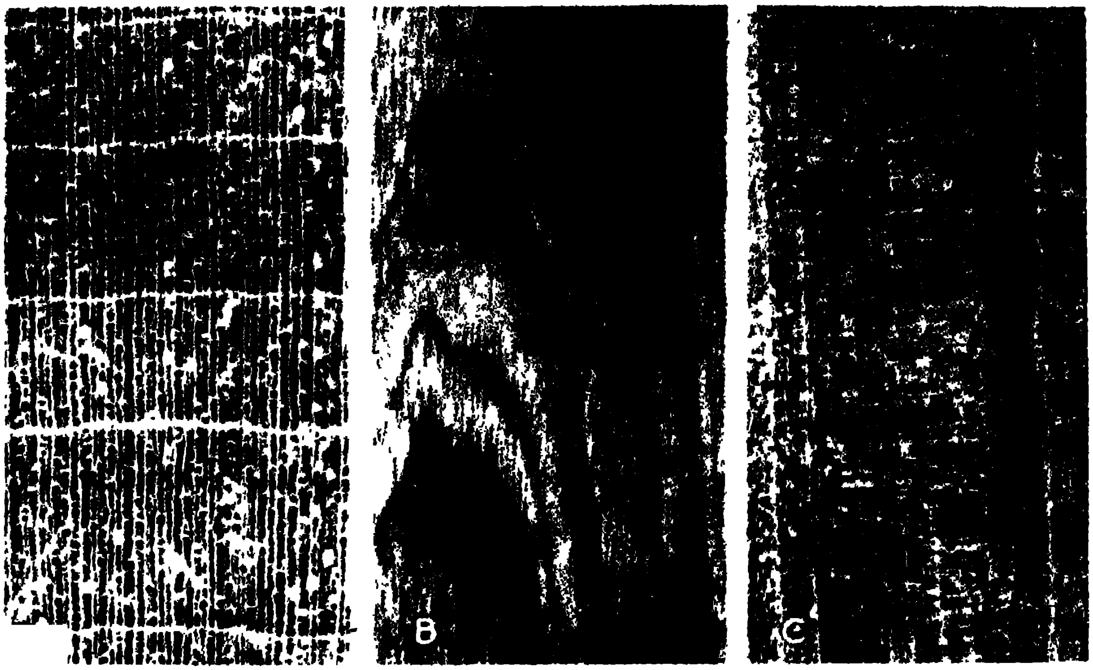
Problem 3. HOW MAY SUITABLE AND SATISFYING FURNITURE BE CHOSEN?

Buying furniture is an adventure whether it is being purchased for a small apartment or a large house. No activity gives more satisfaction than that of assembling furniture harmoniously so that all the pieces look as if they belonged together. Most families expect furniture to last for years, possibly a life time. For this reason one should make a study of



Courtesy Forest Products Laboratory, U. S. D. A.

True mahogany. *A*, end surface; *B*, plain-sawed surface; *C*, quarter-sawed surface.

woods, construction, and style of furniture before buying. Too often furniture buying is a matter of "I like it" or "I do not."

Woods used in furniture construction are important. The ideal furniture wood should have enough hardness and strength to resist wear and yet be soft enough that it can be worked easily; it should be comparatively free from warping or twisting; it should have natural beauty in figure, grain, and coloring; it should finish beautifully; and it should be available at a cost within the reach of the average consumer. Any hardwood which will wear long under ordinary use is good for furniture. Those best adapted to the different parts of each piece are selected for its construction. Generally a strong wood with not special appearance value is used for the inner parts, and wood of great beauty when finished is used for surfaces which show. Mahogany and walnut are the best woods for cabinet use because they are strong, have rich color and distinctive figure, are comparatively free from warping, and have good gluing qualities.

Mahogany is an important reddish brown wood of medium

Courtesy Forest Products Laboratory, U. S. D. A.

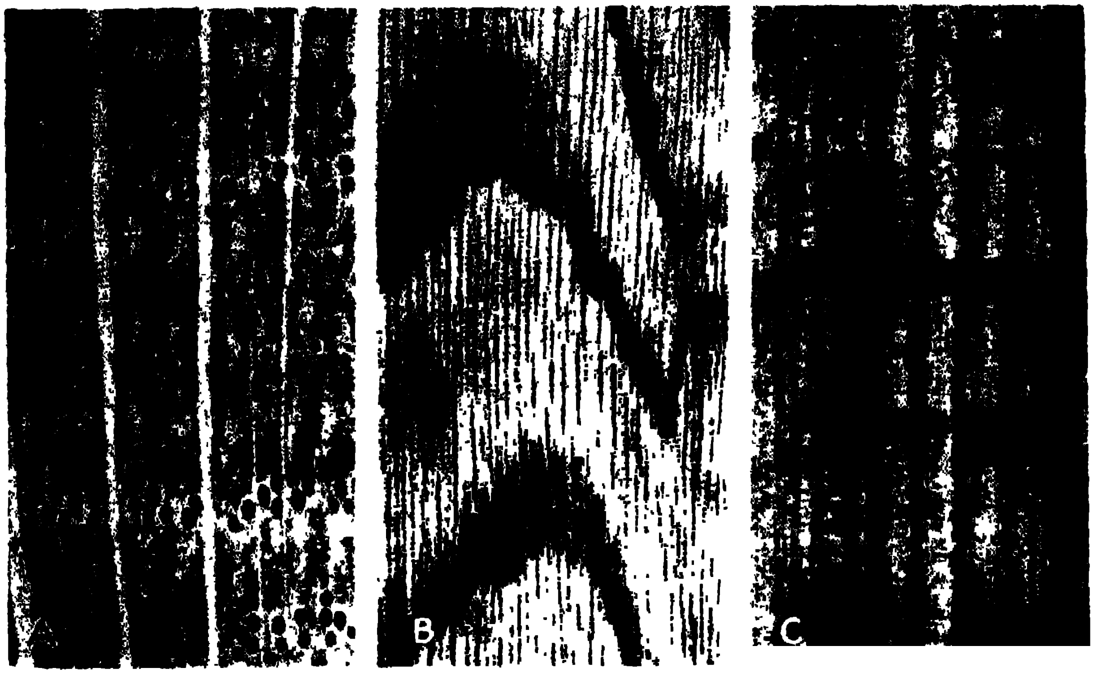
Black walnut. *A*, end surface; *B*, plain-sawed surface; *C*, quarter-sawed surface.

hardness, possessing strength, stability, durability, and beauty. It is noted for a richness which increases with age. Walnut is an American hardwood that takes on a mellow richness with age. Because of these superior qualities, the two woods are used in much of the most expensive furniture.

Oak, cherry, and hard maple are excellent cabinet woods and will stand hard usage. They are used principally in solid furniture and occasionally cut in veneers. These woods are used in making some period furniture.

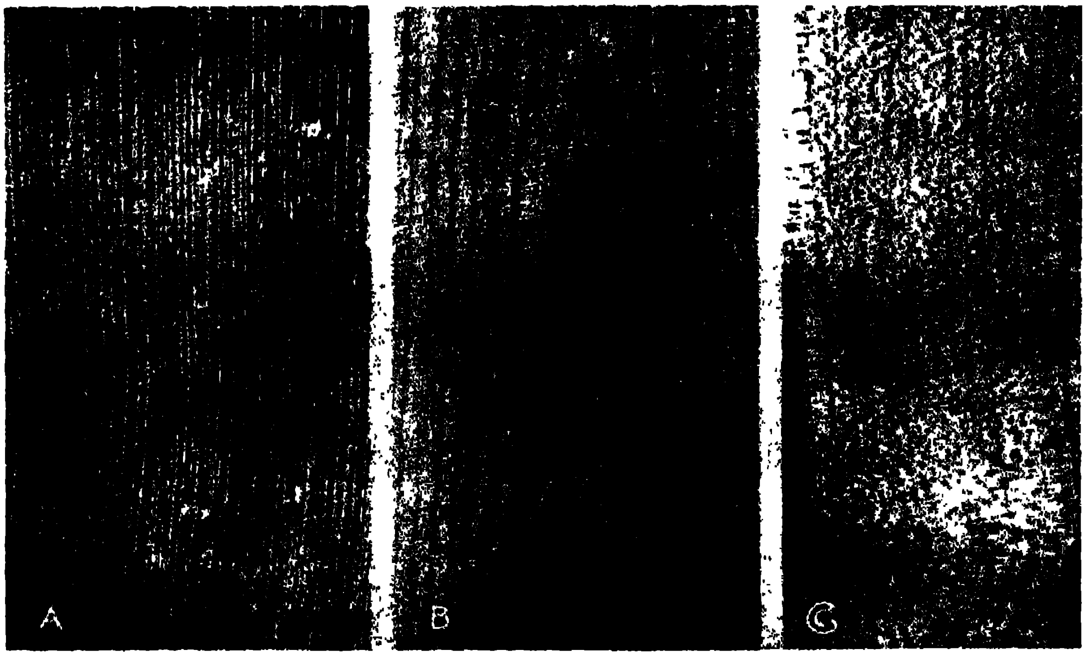
Birch is a hardwood with good shock-resisting qualities. It is often used in the back legs of upholstered furniture and finished to resemble walnut, mahogany, or maple.

Gumwood is a southern hardwood which is commonly used in the structural parts of moderately priced furniture and the main parts of more inexpensive furniture. It is durable but warps and dents easily. It takes a walnut or mahogany finish better than other inexpensive woods. Gumwood sold as such is not a deception and permits families to acquire well-styled and well-constructed furniture at a price within their budget. Upon close inspection it is possible to recognize gumwood by



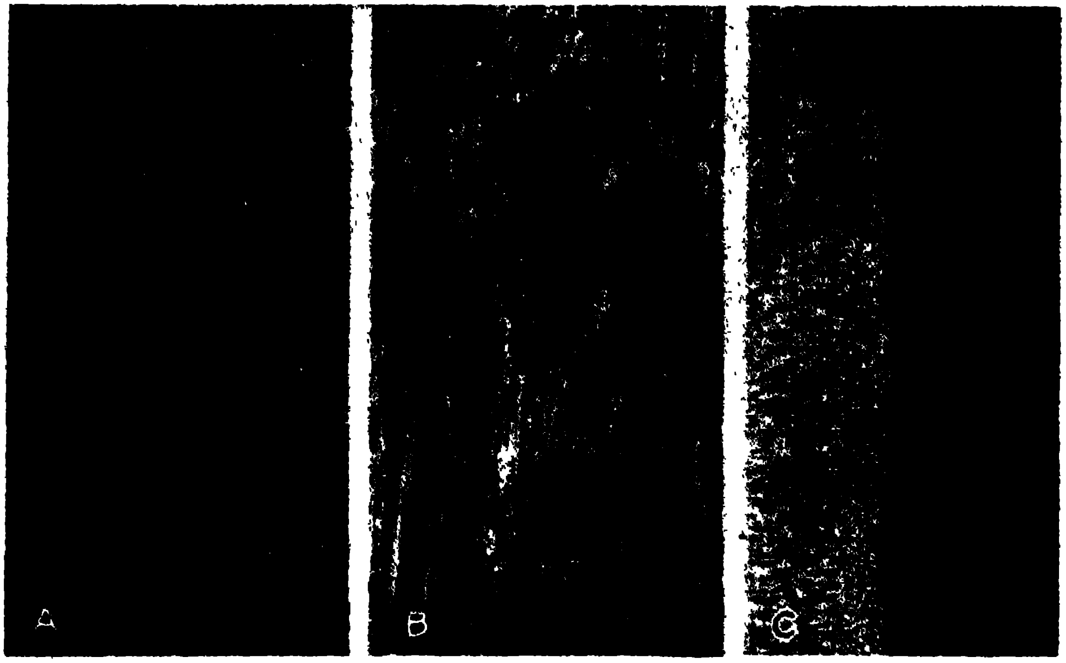
Courtesy Forest Products Laboratory, U. S. D. A.

Red oak. A, end surface; *B*, plain-sawed surface; C, quarter-sawed surface.



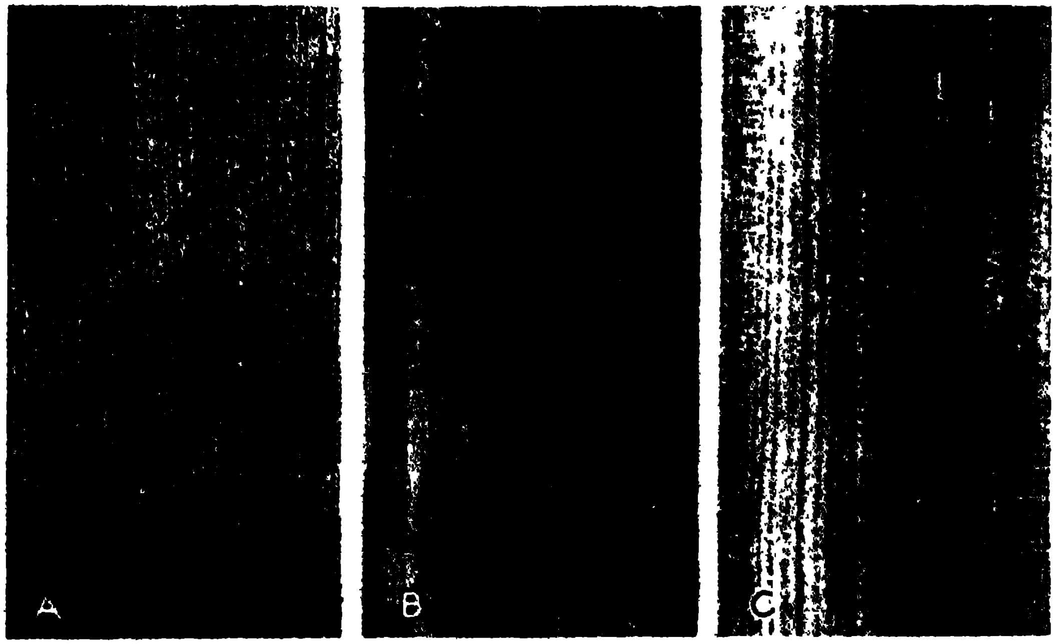
Courtesy Forest Products Laboratory, U. S. D. A.

Red maple. A, end surface; *B*, plain-sawed surface; C, quarter-sawed surface.



Courtesy Forest Products Laboratory, U. S. D. A.

Yellow birch. *A*, end surface; *B*, plain-sawed surface; *C*, quarter-sawed surface.



Courtesy Forest Products Laboratory, U. S. D. A.

Red gum. *A*, end surface; *B*, plain-sawed surface; *C*, quarter-sawed surface.

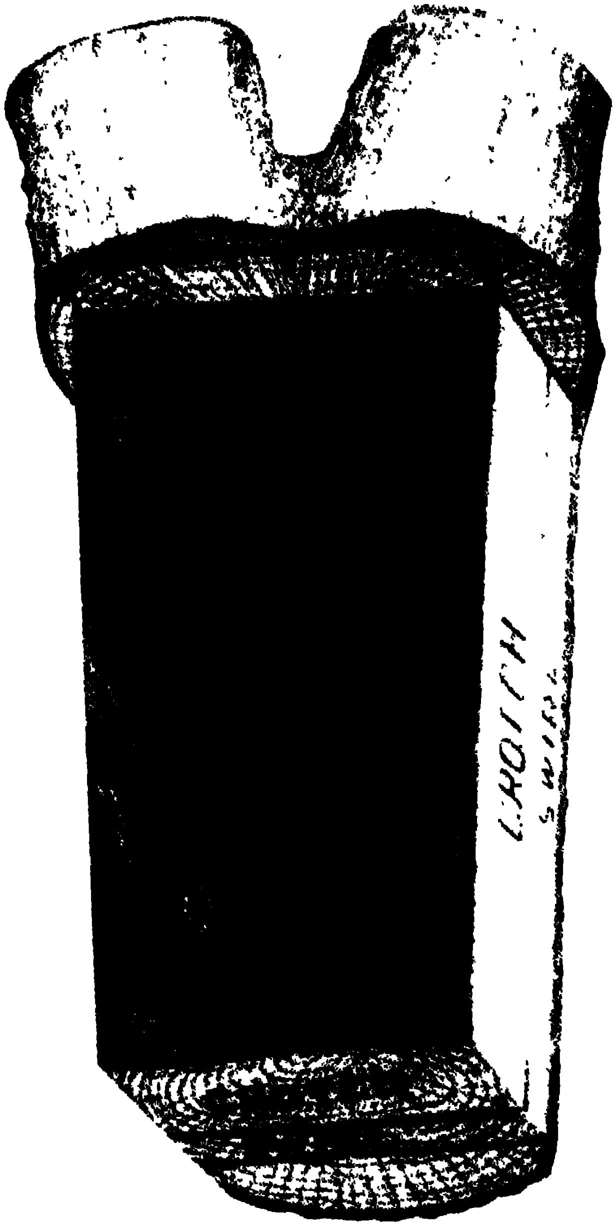
Courtesy United States Plywood Corporation

Veneer is wood cut extremely thin. This veneer is being cut from the trunk of a tree. It is then bonded to a core.

the size of its pores. Mahogany and walnut have large pores easily visible, while gumwood has small pores. There are other hardwoods which may be used as veeners, inlays, and marquetry, but they are less commonly found on the market.

Every piece of wood used in furniture construction should be kiln dried. In kiln drying, the wood is first air dried in piles so that its moisture content is reduced from 35 to 15 per cent, and then the wood is placed in a closed room where the heat, humidity and circulation of air can be controlled. There the moisture content is further reduced to about 6 per cent. In improperly seasoned lumber, the wood may be dried too quickly, the outside of the boards being dry while the inside is still damp.

It is taken for granted that woods used in better-quality furniture are properly dried; however, in the cheapest grades of furniture wood only slightly dried is often used. When this type of material is placed in a warm house, it cracks and warps as the heat dries out the natural moisture of the wood.



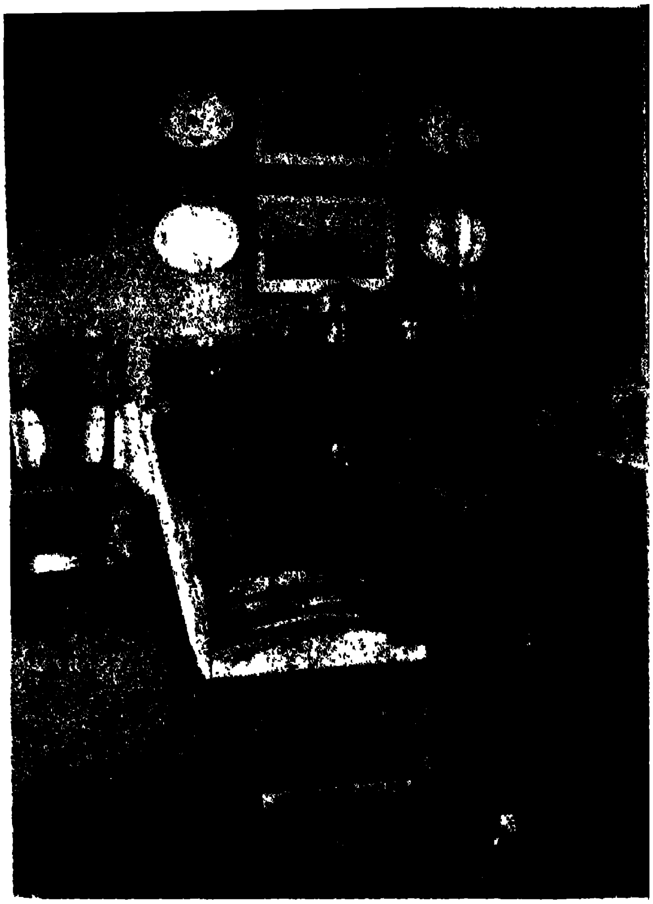
This is the cross section of the trunk of a tree. The division of the trunk of the tree into two branches affects the pattern of the grain of the wood far below.

Furniture is made of solid wood or it is veneered. Solid woods are best when rugged lines or intricate carvings are desired. Tudor, Gothic, Jacobean, and Early American types are examples of designs requiring solid woods. Generally posts, stretches, and other supporting or bracing parts of furniture are made of solid lumber.

When veneer is used the result is not necessarily an inferior piece of furniture as many people believe. Inlay veneers were used for choice pieces of furniture by the ancient Romans. In England, veneers were used in the late seventeenth century. Great designers of the eighteenth century created their finest pieces in this way. Today, veneered furniture may be obtained in different price ranges, depending upon the rarity and beauty of the figure, the size of the piece, and the amount of waste and work necessary in the manufacturing process.

What is meant by veneer? Veneer is wood cut extremely thin, $\frac{1}{28}$th of an inch being the standard thickness. Often it is cut from the part of the tree with an irregular grain to give it a beautiful figure. Some veneers are made from butts or stumps obtained from the base of the tree. Others come from knotlike growths known as burl. Crotch veneer comes from the part of the tree where the trunk divides into two limbs. The most common is called longwood, which is cut from the trunk of the tree.

The face and back of plywood is veneer. When plywood is used in furniture construction, the tops, sides, and drawer fronts should be made of five or seven-ply panels. The cores of the panels should be properly constructed and the veneers laid at right angles to the grain of the core to prevent warping. To prevent splitting, the plywood must be properly dried to a low moisture content. A new process of bonding veneers to the core has been developed whereby the veneers are actually welded under heat and pressure with a resin glue and are thus made waterproof, blisterproof, and moldproof. Matching pieces as drawers, or doors should be sliced from the same piece of wood to obtain perfect matching.



The sheen of fine wood from the hands of a craftsman adds to the charm of a home.

Veneered wood is used in many different ways. It is used on large flat surfaces as in tables. It is also used in pierced work such as chair backs, galleries, and where surface strength greater than that of solid wood of the same thickness is required. Inlays and marquetry may be accomplished with such precision and beauty in veneers that their decorative effects may be said to parallel those of wood carving.

In buying furniture, one should know if the piece is veneered or solid wood. If it is veneered then the purchaser should know the thickness of the plywood. Better qualities of veneered furniture use plywoods of five to seven thicknesses.

Few shoppers are able to recognize all woods after the surfaces have been finished with stains, fillers, lacquers, or varnishes. Rules have been set up by the Federal Trade Commission with the furniture industry. These rules apply to all forms of advertising, labeling, and descriptions and are enforceable at law in interstate commerce. The rules state that:

1. Furniture in which exposed surfaces are of one wood, shall be designated by the name of that wood.
2. Furniture in which the exposed surfaces are of more than one kind of wood, shall be designated as to the woods used.

Many dealers are observing these rules in their advertising. Most stores have tags with space for finish but not kind of wood. The buyer will see the wood finish name as mahogany, walnut, or maple, and will take for granted that the piece is a genuine wood of that name. More extensive work on proper labeling is being promoted by some of the wood manufacturers' associations. In attaching labels to furniture, a manufacturer is permitted to use a tag indicating that the wood is *solid* if all exposed surfaces are of the designated wood such as solid walnut or solid mahogany. If solid walnut or solid mahogany has been used for the frame parts such as legs, posts, and stretchers, and if plywood has been used for the larger surfaces such as panels and table tops, the furniture is labeled as *genuine* walnut or mahogany.

Trade names are sometimes used which are misleading. *Philippine Mahogany* is a name applied to certain woods from the Philippine Islands. It is not a true mahogany and should not be sold as such. *Oriental African Walnut* is likewise only a trade name.

The finish given to any wood used in cabinet work whether of solid or veneer construction is often considered an indication of the quality of the piece. The better finishes require considerable time and labor to complete and, of course, would not be used on inferior pieces. The materials used for finishing are oil varnish, lacquer, spirit varnish, wax, and oil.

The processes involved extend from dipping the pieces into paint or varnish, to the longer processes of sanding, staining, filling, varnishing, rubbing, and waxing to produce a lustrous eggshell finish.

The wood is finished to seal the surface, bring out the depth and tone, to change the color, and to facilitate cleaning. The hand should be run over the surface to see if it is smooth. Flaws in the finish can be detected in this way and the general quality of the finish determined. Table tops, because of the hard wear they receive, should have a special finish. A synthetic lacquer, a phenol-resin compound, is reasonably resistant to heat, alcohol, and acid.

The construction of furniture can not be judged by its appearance alone. Each piece should be examined to see how well it is put together. The wise buyer makes personal investigation of visible joints and inquires concerning others. Usually when woods are joined properly, care is taken in sanding, staining, and polishing the adjoining pieces so that there is little evidence of where one leaves off and the other begins. Several methods are used to join pieces together in furniture construction. The joints should be doweled or mortised and tenoned, reinforced with corner blocks or dovetailed, but sometimes only glue is used. Both dowel and mortise joints are signs of good construction which will insure long and useful service from furniture so joined.

A dowel is a wooden pin which fits into the holes in the pieces to be joined to prevent motion or slipping. A double dowel joint is one in which two wooden pins are used instead of only one. This type offers increased resistance to strain. There are several types of dowels. The spiral glue grooves cut into the wood to insure keeping enough glue in the joint when the dowel is driven in. This is the most satisfactory dowel.

The mortise and tenon joints consist of two parts. The tenon is a rectangular projection left by cutting away the wood around it. It is then swabbed with glue and inserted into the mortise or hole.

Corner blocks which reinforce dowel and mortise and tenon joints are used in all good furniture. They are triangular blocks of wood always glued and preferably screwed to the rails. The grain of the wood in corner blocks should run diagonally to that in the chair or table rails in order to offer additional backing against strain.

Glue is used in all furniture construction but there is a difference in the qualities available. The glues most commonly used are vegetable (made from starch), animal, casein (made from milk), and the more recent phenol-resin glue. Casein glues were considered the most water resistant until the phenol-resin glues appeared. Phenol-resin glues are heat and water resistant and strong. As they are more expensive than other glues, they will be used on medium and higher priced furniture.

Other features characteristic of good construction are shown in the fine detail in the legs, drawers, and backs of cabinets, desks, dressers, and other pieces of furniture.

Legs on furniture are important. On chairs, the back legs should be in one piece running from the floor to the top of the back frame. The front legs should be in one piece running from the floor to the top of the seat frame. The legs should be of suitable size and substantial enough for the size of the piece. Rungs and stretchers give additional support. Massive legs are usually built up by gluing several pieces together before they are turned on the lathe. Such work is called laminated construction and often increases the strength of the leg.

The drawers should be examined carefully to see how the corners are joined. The corners should be joined in a firm and permanent way. Good dove-tailing is a sign of good workmanship and strength of construction. Corners joined by nails and glue are earmarks of poor workmanship. The bottom of the drawer should be set into the drawer side and reinforced by small wooden blocks. Guide strips are used to make the drawer pull in and out smoothly and easily. The inside of the drawer is shellacked or varnished on more expensive pieces of furniture, waxed on inexpensive pieces, and on the lowest priced articles the wood is left bare. This finish on the inside of the drawer protects against moisture, dirt, insects, and against splintering. A small panel between each drawer to make it dust proof is desirable. This panel is often placed between the two top drawers and is omitted from the others, especially in medium and lower priced pieces.

If there is carving it should be examined closely to determine whether it is applied or carved directly on the wood. The skill of the workman shows up in the carving. Today most carvings are roughed out by machines, then cut by hand to bring out their character. On cheap work the carvings are merely wirebrushed to finish them. If well done, there is no objection to applied carving, but if the price is that usual for hand work, one should make sure of the quality.

Even little things such as the hardware denote the quality of the furniture. Thin hardware, any that is out of proportion or out of keeping with the particular design of the piece, is a sign of low quality cabinet work. Doors used on furniture should fit well and open and close smoothly. Casters should pivot and roll easily in any direction. The sockets should be sturdy enough to support the weight of the furniture. Metal glides can be used on lightweight pieces.

Characteristics of different grades of furniture made all of wood have been summarized in the table on page 670.

In selecting upholstered furniture, the wise buyer will seek good workmanship, construction, and quality of material beneath the outside coverings as well as in the portions easily seen. Outward appearance is only "upholstery deep." Upholstered furniture is made up of five important parts: frame, seat construction, springs, filling, and fabric.

The exposed parts of the frame may be mahogany, walnut, maple, birch, oak, cherry, or gumwood. The unexposed surfaces should be of well-seasoned hardwood. Hard maple, ash, and birch are found in the unexposed frame of the finest quality upholstered pieces of furniture. Elm, gumwood, magnolia, and poplar are found in the medium priced. In the cheapest pieces, less expensive pine and other softwoods are used. The frame should be strengthened by corner blocks of hardwood both glued and screwed in place. The joints should be dowe or mortise and tenon construction.

The kind of webbing used in the seat construction as the

CHARACTERISTICS OF ALL-WOOD FURNITURE OF DIFFERENT QUALITIES[1]

Standard and Higher Grades	Medium Grades	Lower Grades
In the standard and higher grades of all-wood furniture the buyer may expect to find:	In medium grades of all-wood furniture the buyer may expect to find:	In the lower grades of wood furniture the buyer may expect to find:
Design: Exact reproduction of originals to scale of good adaptations; fine proportions and graceful lines; all decorations a part of the structural design.	*Design:* Often close copies of original; less attention to fineness of proportions and grace of lines.	*Design:* Sometimes of good design, but often poorly designed with monotonous proportions; sometimes overdecorated.
Woods: Best grades of woods which are hard and strong, either solid throughout or with veneers; great care in seasoning and in manufacture to control moisture in the wood.	*Woods:* Poor grades of the better woods, or veneer on poorer woods, or substitute woods used; woods suited to climate, kiln-dried, but not always given sufficient time for thorough drying.	*Woods:* Soft southern woods which split in northern heated houses; unseasoned; often scraps of different kinds.
Construction: Expert labor, more hand processes; high grade of glue costing about 25 cents per pound; strong, perfectly fitted and glued joints with reinforcements glued and screwed; ply wood used where needed for strength and added beauty.	*Construction:* Skilled labor; good grade of glue; well-fitted, dowelled and screwed construction; reinforced braces nailed and glued, sometimes screwed.	*Construction:* Cheap unskilled labor; cheap glue costing as little as 2 cents per pound; no dowel or dovetailed joints; parts poorly fitted together; reinforcements glued; nails in evidence.
Finish: Highly sanded; permanent stains; many coats of high-grade hard varnish properly dried and well rubbed between each coat; the last coat rubbed with pumice or rottenstone and oil; shellac and wax sometimes used instead of varnish.	*Finish:* Well-sanded, good staining, several coats of medium grade varnish or lacquer with sufficient time allowed for drying, some hand rubbing; dullness and roughness, often seen on edges of pieces in the lower price range; underneath side sometimes not finished sufficiently to prevent warping.	*Finish:* Poor sanding; unnatural color in stains; one or two coats of cheap varnish or varnish stain sprayed without being properly dried or rubbed; poorly sanded surface which does not take a fine finish.

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[1] Florence E. Wright, and Charlotte W. Brenan, *Your Money's Worth in Furniture,* p. 41. Home Economics Extension Bulletin 297, 1934, New York State College.

foundation for springs and filling is important. The best type is firmly woven and is about three and a half inches wide. The strips of webbing are placed close together with each band stretched tightly across the bottom of the seat frame. It is interwoven both lengthwise and crosswise to make a firmer foundation. Tempered steel webbing is sometimes used in medium priced furniture. This is not as comfortable as good-quality fabric webbing, but it will wear much better than loosely woven and poorly interlaced fabric webbing.

Nine to twelve and sometimes sixteen double coil springs of high-tempered heavy-gauge steel are used in a single chair seat in high grade furniture. In the lower qualities, only six to eight single cone coil springs may be found. The size of the spring varies with the use. Large and deep springs are used in the seats, medium-sized ones in the backs, and the smallest in the arms. In fine construction, the springs are tied eight times with strong hemp twine. The twine is then securely fastened to the frame. Correctly tied springs add strength and hold the springs in place so they will return to normal position after the pressure on the seat is removed. A good dealer should be able to tell a customer the number of times springs are tied. The springs are fastened to the webbing so that they are held in place.

Burlap or cotton fabric is stretched over the springs and tacked in place. Some pieces of furniture have each spring sewed separately within burlap or muslin to prevent noise. The stuffing is put over the burlap. In high grade furniture the seat is often double stuffed. This means that a second piece of burlap is placed over the stuffing and the whole quilted. This prevents the stuffing from shifting. Over this an outer coat of cotton is used. This is covered with muslin. The muslin is tacked to the seat frames. The labels should state the kind of filling used.

Long curled horsehair is the highest grade of filling put in furniture. Cleaned moss and short horse and pig hair are used in medium grade furniture. Moss is superior to low grade hair. Tow (from flax straw), sisal, rope waste, cotton, and excelsior are found in low quality furniture. All fillings are covered with a layer of cotton to give a smooth, firm surface. The best cushions should be filled with 75 per cent goose down and 25 per cent small goose feathers. Chicken and turkey feathers are also used but they are less durable. Firm rolls of cotton felt padding should be fastened securely to the edges of upholstered furniture to prevent sharp edges of the wooden frame from wearing through the upholstering covering.

The texture, pattern, and color of the covering in upholstered furniture is important in its relation to other fabrics used in the room. Any upholstering material must be strong and color fast to give good satisfaction. The best material is closely woven of tightly twisted silk or wool yarn. The use of cotton and rayon yarns is increasing. These are tightly twisted, delustered, and combined with silk, wool, or mohair. Cotton and linen friezes are materials of medium quality. Of the inexpensive materials, upholsterer's denim is the most satisfactory. New materials of synthetic yarns are introduced from time to time.

Characteristics of three grades of upholstered furniture are summarized in the table on pages 674 and 675.

Another phase of the problem of choosing suitable furniture is that of obtaining comfortable sizes. Chairs are the worst offenders in this instance. The best way to determine if these are right is to sit in them in the customary postures before buying. However, sizes in furniture have been standardized, and those constructed to meet the requirements of a person who is 5 feet 8 inches tall will be found to be comfortable by a majority of people. An exception to this are the requirements for a bed of an individual 6 feet or more in height. Common measurements follow:

18 inches	height of seat of the chair
18 inches	depth of seat of all-wood chair
24 inches	depth of seat of cushioned chair
$\frac{3}{8}$ inch	down slant from front to back
17–19 inches	above the seat, the top slat of the chair

Detailed consideration of certain pieces of bedroom furniture is pertinent, in view of the importance of the night's sleep to the individual. Although the bedstead may add a decorative note to a bedroom, the springs and mattress are the parts which may contribute directly to the comfort of the sleeper. Proper springs allow one to relax on a yielding surface which supports the body uniformly and naturally in all positions.

There are three general types of bedspring, each of which differs in construction and in the comfort yielded to produce sleep. A woven-wire or fabric spring is so called because it is made from wires which are slightly coiled and woven similar to a cloth fabric. It is the cheapest spring to make, but it is also the most uncomfortable on which to sleep. Cribs, baby beds, and youth beds commonly have this type of spring, although it is better to use a coil type after the first year, or for persons weighing more than 40 pounds. For heavier and taller persons, the fabric spring is unsatisfactory because it fails to conform to the points of heaviest body weight and it develops a permanent sag.

The link type of spring is made from links of stout wire which are joined together end for end, the whole being fastened to a framework by springs. It is moderate in price and fairly comfortable to sleep on. When there is no weight in the bed, the springs are flat, but it sags when weight is applied.

The coil type of spring consists of a large number of vertical coil springs which are fastened together in such ways as to produce a yielding surface. In some bedsprings large conical coils set in steel frames and fastened together by small cylindrical helical spring ties produce comfort and reduce sway. In others the coils are held by straight wires at the top. This connection is less durable than that with helical spring ties.

The gauge or thickness of the wires, and the diameter, shape, and number of coils are other factors in the construction of coil bedsprings that affect comfort and durability. More resiliency may be obtained by using more and smaller coils of a light-gauge wire. As a rule, about 99 properly designed coils of No. 10- to 12-gauge wire will give a good foundation for a full-sized bed. Coil springs are generally regarded as more comfortable than fabric or link springs.

CHARACTERISTICS OF UPHOLSTERED FURNITURE OF DIFFERENT QUALITIES [1]

STANDARD AND HIGHER GRADES	MEDIUM GRADES	LOWER GRADES
In the standard and higher grades of upholstered furniture the buyer may expect to find:	In medium grades of upholstered furniture the buyer may expect to find:	In lower grades of upholstered furniture the buyer may expect to find:
Design: Graceful curves combined with straight flowing lines giving beauty, strength, and comfort; harmonious proportions; carving where used hand done and emphasizing structural lines.	*Design:* Good, but perhaps with less graceful curves and less harmonious proportions; effect sometimes clumsy; carving less well done and tending to seem added, rather than a part of the structure.	*Design:* Often good, however curves sometimes exaggerated and producing bulges; pieces often heavy or clumsy; comfort often lacking; decorative features, such as plastic wood or machine carving, used to distract attention from poor proportions.
Outer covering: Material of good quality, of beautiful color, and of good design; well tailored; trimmings used sparingly.	*Outer covering:* Material of less good quality but often good in color and design; occasionally color crude and design too conspicuous; trimmings sometimes overused.	*Outer covering:* Material of poorer quality but often of good color and design; gaudy colors and pronounced pattern more frequent than in better grades, material possibly pieced and pattern often poorly placed.
FRAME *Exposed part:* Made of mahogany, walnut, and other fine woods; well finished.	FRAME *Exposed part:* Made of gum, birch, or other woods stained to look like mahogany, walnut, or other fine woods, fairly well finished.	FRAME *Exposed part:* Made of soft, inexpensive woods, stained.
Covered part: Hardwood, such as ash or maple, which is strong and holds tacks firmly; joints closely fitted and dowelled or dovetailed, screwed, and glued; fitted corner blocks, glued and screwed in place to give strength; arms reinforced with metal where they meet the seat frame.	*Covered part:* Inferior grades of hardwood or better grades of soft; joints may be dowelled, often screwed, corner blocks glued, sometimes screwed and sometimes nailed instead of screwed in corners of seat arms reinforced with wood strips.	*Covered part:* Knotty hard wood or soft wood which does not retain the tacks; joints nailed together, sometimes with a few screws or bolts added or occasionally a cheap style of dowel construction; glue of poor quality used.
Webbing: Finest quality, usually red striped; strips placed close together; each end attached to frame with at least nine tacks; used in seat, back, and arms.	*Webbing:* Medium quality, strips of webbing not closely interwoven and fewer tacks used; sagless or supersagless construction or steel bands or wires substituted.	*Webbing:* Cheapest grade, with a few strips far apart; sometimes metal bands, stout wires, or wooden slats substituted.

STANDARD AND HIGHER GRADES	MEDIUM GRADES	LOWER GRADES
Springs: Double coil, used in seat and back; placed close together but not touching; tied with eight knots; using Italian flax twine springs on outside edge in seat reinforced with extra ties; edge wire attached to top of outside seat springs with twine to give extra support.	*Springs:* Double coil used in seat and back; fewer used and not so close together; tied with eight knots; quality of twine varying; springs on outside edge sometimes not reinforced; edge wire if used usually attached to tops of outside seat springs with metal clips instead of with twine.	*Springs:* Used in seat only; few in number and far apart; tied with four knots; double-coil springs used with webbing; single-cone springs used with metal band or wire supports and possibly not tied.
Burlap for covering springs: Strong, closely woven, from 10- to 12-ounce grade.	*Burlap for covering springs:* Less firm, 10- or 8-ounce grade.	*Burlap for covering springs:* 8-ounce grade.
Stuffing and padding: Finest grade of long curled horsehair, two layers of hair stuffing often used with burlap between the layers; firm rolls of foundation padding used on sharp edges of wooden frame; best grade of cotton felt covering hair; strong, firm muslin over all.	*Stuffing and padding:* Medium or cheap grade of hair or a mixture of moss and hair; rolls of hair or other filling too soft to hold shape; medium grade of cotton felt used as covering; muslin cover beneath outside upholstering possibly less firm.	*Stuffing and padding:* Coco fibre, palm leaf fibre, sisal, tow, or excelsior; rolls may be missing or made of inexpensive material such as burlap or twisted paper; thin layer of poor quality cotton felt or plain cotton covering stuffing, cotton sometimes omitted; muslin covering omitted.
Cushions: Feather-proofed ticking channeled three or more times across, stuffed with down or a mixture of 75 per cent down and 25 per cent goose feathers; less down and cheaper grades of feathers as quality decreases.	*Cushions:* May be: (1) innerspring unit covered with three to five layers of cotton felt over which muslin may or may not be used; (2) medium-grade ticking filled with 50 per cent or less of down and 50 per cent or more of feathers, which may be goose, duck, chicken, or turkey, the last being less desirable; may not be channeled.	*Cushions:* May be filled with: (1) a core of cheapest cotton with a layer of kapok over it and with no muslin covering between the filling and the outside cover; (2) kapok alone, of various grades, with or without muslin covering; (3) inner-spring unit covered with from three to five layers of cotton felt, with no muslin between felt and outside cover.
Comfort: Very comfortable and soft; giving to the pressure of the body fitting and supporting it.	*Comfort:* Comfortable as long as the frame is firm and the webbing does not stretch or the tacks loosen or materials disintegrate.	*Comfort:* Uncomfortable, hard, and unyielding. The shape not fitting the body.

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[1] Florence E. Wright, and Charlotte W. Brenan, *Your Money's Worth in Furniture,* p. 28. Home Economics Extension Bulletin 297, 1934, New York State College.

Changes in the resiliency of bed springs to meet the requirements of increased weight or altered distribution of weight may be desirable from time to time during the lifetime of an individual.

The mattress combines with the springs to give sleeping comfort. The filling of a mattress and its construction are the factors influencing its quality. These are hidden and hence are generally a matter of conjecture for the consumer. At the present time, bedding laws are inadequate to prevent the practice of using unsterilized second-hand materials for filling. An official label giving the manufacturer's name and address and identifying the filling should be attached to the mattress, and claims made by the manufacturer should be backed by a statement from the seller.

The fillings and construction most commonly used include:

Hair mattresses. Long, curled, horse- or cattle-hair fillings possess great resiliency, do not pack easily, are durable, but are relatively expensive. They may be remade with good results when they have lost their resiliency. Cattle hair is not as resilient as horsehair and it may have a slight unpleasant odor in damp, hot climates. Hog hair and goat hair are also used but are less desirable than either horse or cattle hair.

Cotton mattresses. The best cotton mattresses are made of felted cotton filling, or of cotton batting. Each of these should be made of clean, good quality cotton, compressed somewhat before being placed into the mattress ticking. They can be renovated satisfactorily. Blown cotton is apt to settle into a lumpy uncomfortable bed.

Kapok mattresses. Kapok is highly resilient when new, and it is relatively inexpensive. It cannot be renovated for its fibers eventually disintegrate into a powdery mass. However, with frequent sunning and airing its useful life may be considerably lengthened.

Innerspring mattresses. The durability of an innerspring mattress is dependent upon the quality of padding and the construction of the springs used. The springs should be securely fastened together and well covered with a thick padding of hair or cotton. Each spring may be covered with cotton fabric. An innerspring mattress, although desirable, should not be expected to take the place of good springs.

The ticking used for any mattress should be strong. Federal specifications indicate as advisable a minimum of 78 threads in the warp and 62 threads in the filling. Color fastness is another important item. A plain edge on a mattress is as serviceable as a rolled edge and it is less expensive to make. Tufts, to prevent undue shifting of the mattress filling, should be about 12 inches apart.

Comfort in a bed is more or less a matter of personal preference, some people liking a hard bed and others being satisfied only with a soft one. Tests to discover the proper combination of springs and mattress are offered by Laird:[1]

> Do you sink down comfortably, and without a sag at the hips when you lie on your back?
>
> Does the combination of spring and mattress remain somewhat firm so you can turn easily from the back to the side?
>
> When on your side, does the shoulder settle in comfortably without twisting and without pressure?
>
> Can you place the downward arm almost anywhere with comfort?
>
> Does your hip sink down without your back sagging downward or being thrown upward?

It is as difficult to obtain a desired quality of pillows as of mattresses, because again the bedding laws are not adequate to protect against misrepresentations. Unless the filling of the pillow can be examined, the label and the reliability of the retailer must be depended upon.

The filling and the tick determine the quality of pillows. The fillings most commonly used include:

Down. This is the light fluffy filament from the under coatings of waterfowl. It is the lightest and softest of fillings, but in pillows it may allow the head to sink too far. Goose feathers may be mixed with down to produce a satisfactory buoyancy.

Goose feathers. Feathers from the domestic goose, either white or gray, make excellent pillows. The feathers may be

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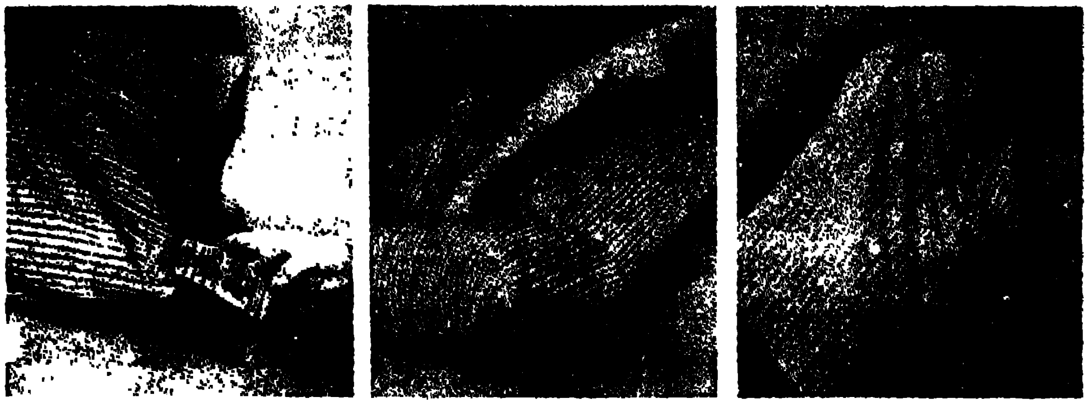
[1] Donald A. Laird, "The Heredity of the Modern Bed—and Its Inborn Weaknesses," *The Scientific Monthly,* vol. 41, p. 420, Nov., 1935.



Courtesy *The American Consumer*

Inspect pillows carefully before buying. *Left*: Many states require that the contents of a pillow be stated on the label. *Center*: A good punch will give an idea of the softness of a pillow. *Right*: A few vigorous shakes will indicate whether or not a pillow is well filled. Remember that it should be light for its size, too.

used whole, or the quill may be removed leaving a slit feather.

Duck feathers. These feathers have a less resilient shaft than the goose feathers have. The domestic duck feathers are as clean and resilient as the Chinese.

Chicken feathers. These feathers are the cheapest and the least desirable. They have no resilience unless processed to produce an artificial curl, which eventually mats down. They make a heavy, stiff, hard pillow.

Turkey feathers. These have the same general characteristics as chicken feathers. Either may be found mixed with duck and goose feathers to reduce cost.

Kapok. This silky material is light and fluffy but as in the case of mattresses it breaks up into wads through use. Persons who are sensitive to certain dust or to the protein in feathers should use this filling in their pillows.

Tests to perform when buying pillows include the following:

1. Read the label to determine contents.
2. Beat and watch for flying dust particles to determine cleanliness.
3. Squeeze in the hand pillows of different grades, noting the rapidity with which they spring back to determine resiliency.

4. Compare the weights of different pillows of equal size to determine which is the lighter and therefore the better.
5. Smell to determine if the feathers have been properly cured.
6. Try to shake the filling down by holding the pillow by one end. It is inadequately filled if more than 2 or 3 inches of space are left.

Before buying, one should decide the style of furniture wanted. Styles of widespread acceptance have been developed over a long period of time. The average person who wants traditional furniture should go to a library or museum and study examples of the various periods. Modern furniture is easier to buy because there is no tradition back of it. In modern pieces emphasis has been placed on comfort, simplicity, and usefulness. According to some authors, modernism is not a style but a mood.

Size as well as style should be considered in selecting pieces of furniture. A piece too large may dominate the rest of the room and throw the entire room out of balance. If the ceilings in a room are low, the furniture should be low. High pieces are better in a room with high ceilings.

In order to complete a sale and have satisfied customers, many dealers are willing to deliver the piece of furniture to the home for a trial period. This gives the purchaser an opportunity to see it in relation to the room and other furnishings. He may then decide whether his choice fits.

A good rule to follow in furnishing a home is that of purchasing a few pieces of good furniture rather than covering the floor space with a "lot of bargains."

Suggested Activities

1. Observe several pieces of all-wood furniture to discover points in its construction and finish which denotes a high quality of workmanship.
2. Identify the various common woods used in furniture making.
3. What grades of upholstered furniture are offered on your local market?
4. Plan the furniture for the living room of a young couple having an income similar to that of your friends.

5. Investigate the local market in regard to the range of qualities and prices of one of the following articles used in the rest area:

    Mattress
    Springs
    Bedstead
    Dressers
    Bedroom chairs
    Pillows

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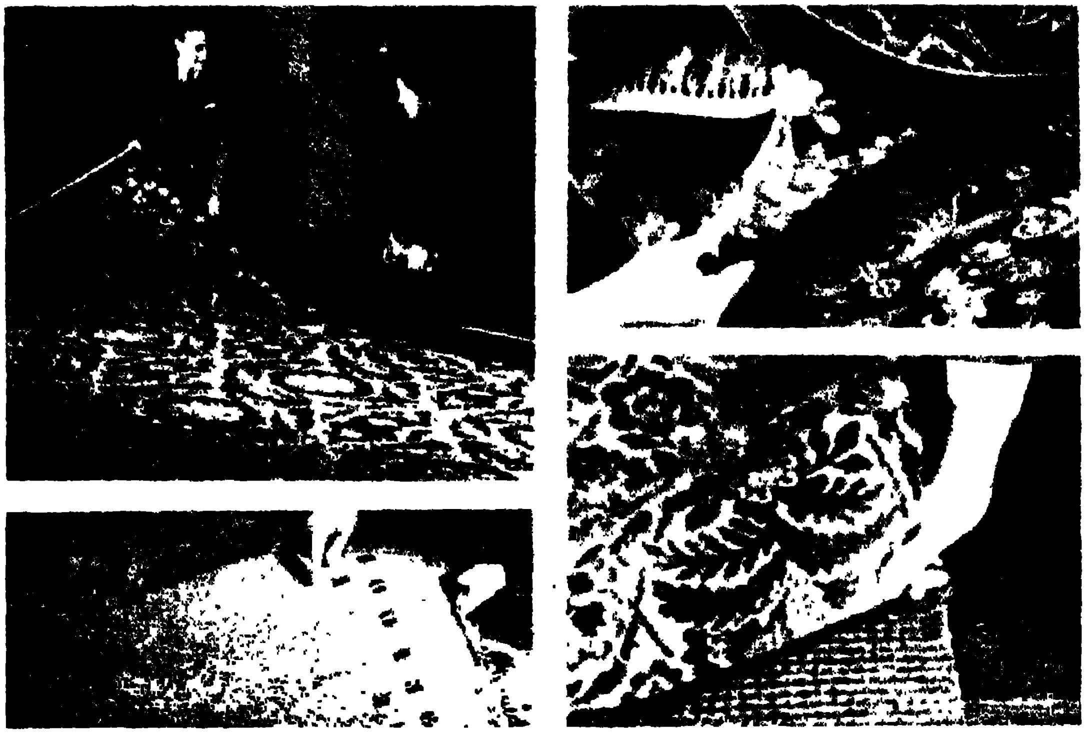
Problem 4. WHAT SHOULD BE CONSIDERED IN THE WISE CHOICE OF FLOOR COVERINGS?

The floor is the foundation of the room from both an architectural and a decorative standpoint. When planning the furnishings of a room, the floor and its covering should be considered either as a background or as a decorative feature. The customary way of regarding a floor or its covering is as a background for the furnishings of a room. Although pattern may be used it should be unobtrusive and keyed to be secondary in interest to the other furnishings. Whether patterned or plain, its color should always be related to the other colors used in the room.

There are a few places in which the floor may become important from a decorative standpoint. In halls, foyers, and rooms in formal houses where there is a minimum of furniture, the floor may become the major decorative feature. In a



Courtesy *The American Consumer*

Study rugs carefully before buying. *Upper left*: Inspect the rug as a whole for pattern, color, and weave. *Upper right*: Check the depth and density of the pile. Does the dye go all the way through to the backing? *Lower left*: The back of the rug will show the number of tufts per square inch. *Lower right*: The wearing quality is increased 70 to 100 per cent by a rug pad.

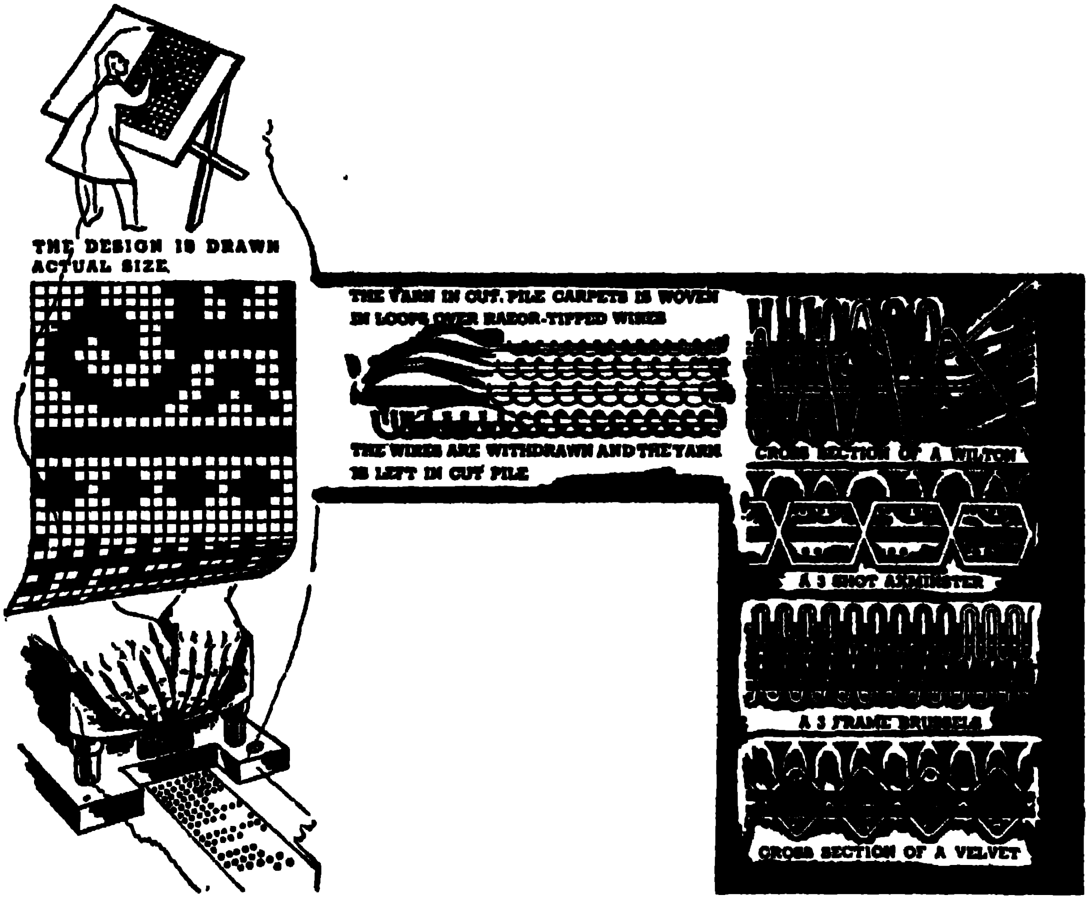
few other cases it is justifiable to make the floor or its covering important. A floor covering of unusual beauty should take its place in the decorative scheme. A room that is unusually large or plain might profit by having its floor covering important in design. In most homes, however, unity in a room is disturbed by a floor covering that is too prominent.

In nearly all of the rooms of the house it is desirable, if possible, to have some form of covering on the floor. Beautiful woods, beautifully finished and kept are attractive, but floor coverings add warmth and make the floor more comfortable to walk on, dull and absorb noise from walking and echoes, and, if properly chosen, contribute to the general decorative scheme. Carpets that cover the entire floor make rooms appear larger than do the smaller coverings, and they impart a certain richness to the whole scheme. If it is planned to use carpets to the wall in a new house, inexpensive floors may be used. A large majority of people, however, select rugs instead of carpets because rugs seem adaptable to a greater variety of places. They are woven in certain sizes usually with a border forming a frame. The most common sizes are 27 inches by 54 inches; 36 inches by 63 inches; 4 feet 6 inches by 6 feet 6 inches; 6 feet by 9 feet; 7 feet 6 inches by 9 feet; 9 feet by 12 feet; 9 feet by 15 feet; 11 feet 3 inches by 12 feet; 11 feet 3 inches by 15 feet.

For the decorative reasons mentioned above and because floor coverings usually involve a substantial sum and become more or less permanent possessions, it is important to make a wise decision in their choice. It is necessary not only to be familiar with the decorative effects produced by the pattern, color, and texture of floors and their coverings, but a knowledge of the various kinds of floor coverings on the market and something about their weaving qualities and special uses is also important.

Durability in a carpet or rug is greatly affected by the density and compactness of the pile, and the depth of the pile; the type of weave is less important. Durability is also dependent upon the quality of wool used. Coarse, wiry, resilient virgin wool is the kind used for the better grade rugs. The yarns used for rugs are either worsted or woolen. Worsted yarn is made of long fibers combed as nearly parallel as possible and then twisted. It costs more to produce, but it wears better than woolen yarn which is made of short and long fibers mixed together and laid in any direction in which they happen to fall. The amount of twist given the yarn is another important factor. Yarn may be three-, two- or one-ply, according to the number of strands twisted together.

The rugs and carpets on the market are usually classified as machine-made or handmade. The machine-made carpets and rugs are made mostly in this country. The pile weaves of this group include Wilton, Axminster, velvet, Brussels, and Chenille; and the flat weaves include ingrain, linen, grass, and others. The handmade rugs are almost all imported, although some hooked rugs and rag carpets and the Navajo

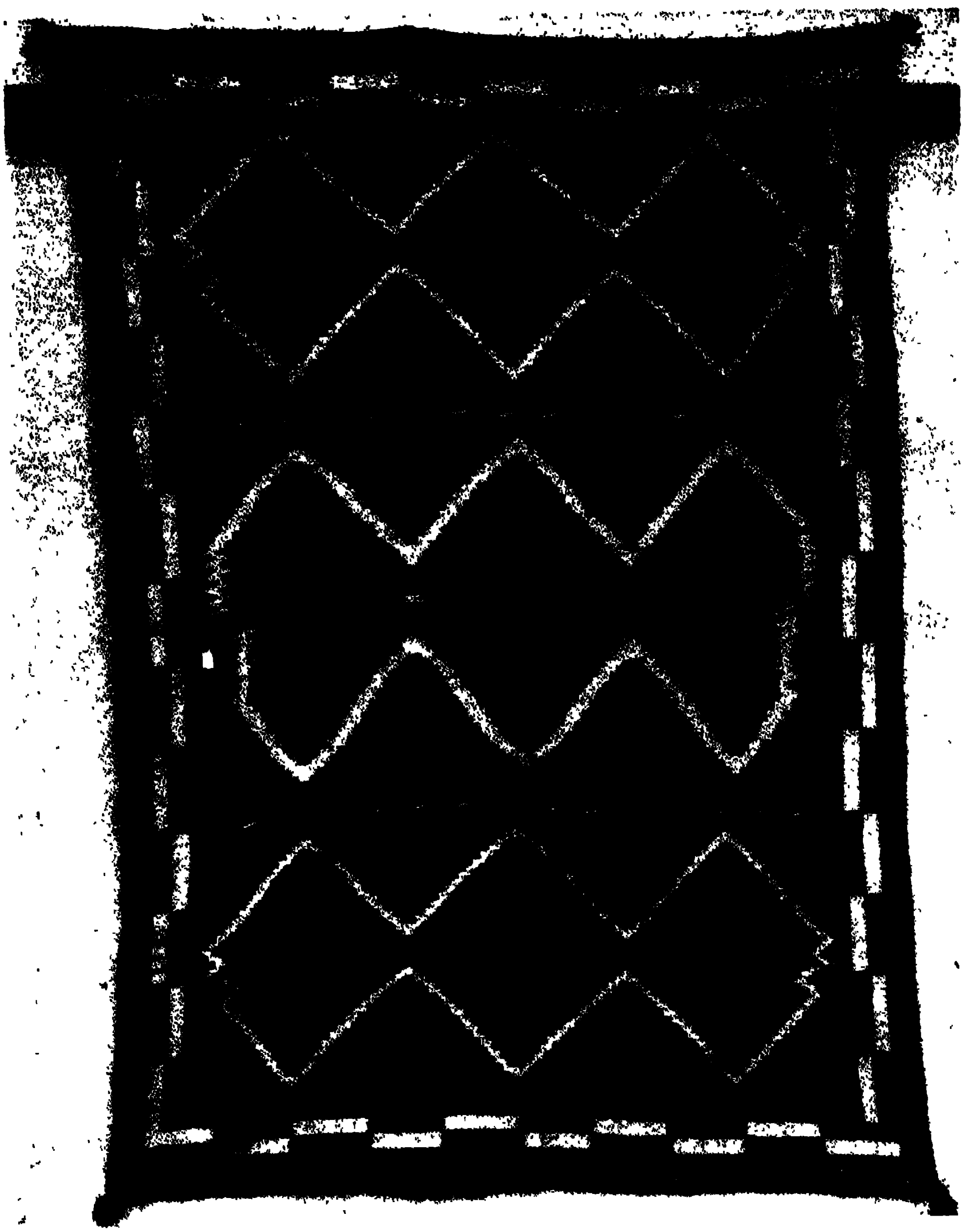

THE DESIGN IS DRAWN ACTUAL SIZE
THE YARN IN CUT PILE CARPETS IS WOVEN IN LOOPS OVER RAZOR-TIPPED WIRES
THE WIRES ARE WITHDRAWN AND THE YARN IS LEFT IN CUT PILE
CROSS SECTION OF A WILTON
A 3 SHOT AXMINSTER
A 3 FRAME BRUSSELS
CROSS SECTION OF A VELVET

Courtesy Marshall Field and Co.

A diagrammatic drawing showing the processes involved in the preparation of a design using Jacquard cards, and a cross section of various types of weaving. The design is worked out on squared paper which has as many squares as the rug will have tufts of wool. In operation, long wires or needles are either passed through the holes in the Jacquard cards or are stopped by blank spaces; thus strands of yarn required to form the design are lifted to the surface of the carpet. The other strands are left buried in the body of the high-grade carpet.

rugs are produced in this country. Of the handmade rugs the Oriental rugs comprise the pile weaves, and certain rugs and carpets of the craft type, such as the Navajo, Mexican, and Scandinavian products comprise the flat weaves.

Because Wilton carpets are generally regarded as a standard of high quality, velvets are sometimes spoken of as Wiltons. The Federal Trade Commission designates, however, that a rug or carpet is not Wilton unless it is woven on a Jacquard loom. This loom has a mechanism which consists of a num-



Courtesy The Metropolitan Museum of Art

Navajo Indian blanket of the nineteenth century.

ber of frames or cards in which holes are punched indicating the pattern to be woven. These frames, when threaded with yarn and attached above the loom, lift to the surface the colored yarns which are to appear in the design, at the same time depressing all yarns not appearing. The depressed yarns thus become buried in the body of the carpet, adding to the dura-

Courtesy Marshall Field and Co. Photographed by Hedrich Blessing Studio

A Rya rug on the floor of a Swedish Modern house. This rug is from the studio of Elsa Gullberg in Stockholm.

bility of the fabric and to its softness and resiliency, and making it possible to follow the pattern of the rug on the back. With the Jacquard attachment it is possible to use only five or six colors, and as few as two may be used. By a process of holding half-tones of the colors of the yarn in the back of the carpet, this number may be increased. Fine Wiltons are woven with three-ply yarn or six frames making about 120 tufts to the square inch. Medium-grade Wiltons may be made with two- or three-ply yarn on three to five frames and with about 90 tufts to the square inch. Low grades have only two frames, and as few as 25 tufts to the square inch. There should be little or no glue on the back of a good Wilton, glue being employed chiefly when the weave is not sufficiently firm. Wiltons comprise over 10 per cent of the rugs and carpets manufactured in the United States.

It is said that about 60 per cent of the rug and carpet yardage sold is Axminster, a colorful floor covering with a thick, cut pile. The pile is made by fastening tufts of woolen yarn into the warp. Jute, usually used in the welt, shows in pronounced ridges in the back which prevent rolling Axminsters crosswise. Most of the wool appears on the surface, the tufts being bound into the body with cotton threads. No pattern appears on the backing. The quality varies according to the depth of the pile, the quality of the wool, the number of rows to the inch, and the pliability of the backing. Fine quality Axminsters have 3/8 inch pile, a fairly pliable backing, and 77 pile tufts per square inch. Medium grades have shorter pile and approximately 56 to 63 tufts to the square inch, and the lowest grades have as few as 28 to 35 tufts to the square inch.

Velvets are cut pile carpets with all the yarn appearing in tufts on the surface. Because of a simple manner of binding the tufts, velvets require less yarn than do Axminsters. As a result, velvets are cheaper than Axminsters, but the better grades are durable. Most plain-colored rugs and carpets are made with the velvet weave and in good qualities resemble the Wilton. However, such carpets do not have the wool buried in the back and therefore lack the resiliency of the Wilton. In the patterned weaves, the colors of the pattern are printed on the yarn before it is woven; therefore more colors can be used. The back of a velvet carpet made up of jute yarns is heavily sized with glue to make it stiff. Fine quality of velvets have a pile depth of 5/16 inch and 80 tufts to the square inch, while lower grades have shorter pile and 56 or fewer tufts per square inch. It is estimated that about one-fourth of the carpet and rug yardage is velvet.

The tufts in any of these carpets can be counted by the small squares on the back.

Brussels carpet and rugs are seldom produced now. They are woven on the Jacquard loom and have the same characteristics as Wiltons except that the pile is left uncut, leaving tightly looped wool on the surface. This kind of carpet is commonly called Body Brussels to differentiate it from Tapestry

Brussels, which is a variation of velvet. Patterns resembling the old hooked rugs are made in the velvet weave leaving the pile uncut. Otherwise such rugs have characteristics similar to those of velvet carpet.

Chenille carpets are conceded to be the most luxurious of those made in this country. They are nearly always made to order and may be had in any size or color, being the only kind that can be produced as wide as 30 feet without a seam. They are more expensive than other rugs in any size because two operations are necessary in their manufacture. Furry ropes of yarn held together by cotton threads in the center are first made. These, pressed into a V-shape, are caught on a wide loom onto a wool back by cotton threads. Chenille carpets are made in a variety of grades, these being dependent upon the quality of the wool, the number of fur strips to the inch, and the depth of the pile. The finer qualities of Chenille are firm. Less than one per cent of the total yardage of rugs and carpets is Chenille.

A few variations of the Wilton, Axminster, and velvet weaves should be explained.

Saxony rugs are a type of Wilton, being woven of woolen yarn and having a softer, longer pile than other Wiltons. They are made with from three to six frames and have 68 to 72 tufts per square inch. They are exceedingly durable, but they have a coarser pattern than other Wiltons, owing to the large, loose tufts.

Combination loop and cut-pile rugs are made on two frames by the Wilton process. Usually only one color is used, but because of the loops and cut pile they have a two-tone effect shown by embossed appearing designs and ropelike stripes.

Frieze carpets are produced by permanently twisted threads woven in Wilton, Axminster, or velvet weaves.

Luster-type or sheen-type rugs were originally known as American orientals. They are made of worsted or wool yarn with Wilton, Axminster, or velvet weaves. Their sheen is produced by a chemical wash, the same treatment as is given most modern handwoven Orientals, or by a subtle blending of

Courtesy The Metropolitan Museum of Art

A gallery view of rugs of various countries.

shades in the yarn before it is woven. Some have the same appearance on the back as other power-loom rugs, and others have the pattern through to the back as in genuine Orientals.

Rugs and carpeting of the flat-weave type are alike on both sides and are thus reversible. Patterns may be woven in the rug or printed on the surface. The materials used are linen or flax, fiber, grass, or wool and fiber. They are used for indoor and outdoor porches and for temporary rugs in rooms used for living or dining.

The handmade imported Oriental rugs in high grade are regarded as the choicest of all floor coverings. Each rug has its own value, which is determined by its age, rarity, beauty of color and design, the quality of wool, and the fineness of the knots. The rugs are named for the districts in which they were made. Each district has its own characteristics of color and design, the pattern of which has been preserved with great care and passed from one generation to the next. The recognition of these designs and the judging of the quality of the rug is an art which is acquired only after much study, although Whiton maintains that there are only six classifications and less than fifty kinds.[1]

Antique Orientals made prior to 1875 are generally of great beauty and are seldom found on the market. Semi-antiques are the newer rugs that have not been chemically washed. Modern Orientals are made on hand looms in factories in which production is greatly accelerated. To produce a mellow appearance similar to the older rugs, the fibers are washed chemically, or the surface is dyed by a painting process. The former treatment may damage the wool, and the latter may not penetrate to the bottom of the tufts.

The purchase of an Oriental rug should be made only after much study and comparison of many rugs, and after a reliable dealer is chosen. Pile should be firm and even, and although the pile is on the surface, the pattern is repeated on the back. The best rugs have a fine texture produced by many knots varying from 400 to 500 knots to the square inch. Good modern Orientals have between 100 to 200 knots per square inch. Oriental rugs are, for the most part, beyond the reach of the ordinary purse. They introduce an incongruous note of luxury in homes that are not luxurious. Nor is this all. They present a problem in interior decoration because of the geometric outlines of their motifs. These combine unpleasantly, if at all, with many of the floral designs often found in wallpapers and drapery fabrics. The effect of several small Oriental rugs in one room is likely to be one of spottiness and dispersion rather than harmony and unity. If they are carefully chosen and the rest of the furnishings are keyed to them in luxuriousness, coloring, and design, Oriental rugs may be used successfully. They do not belong with maple furniture or in simple cottage homes. For these the braided rug of colonial days is more satisfying.

Suggested Activities

1. Examine and become familiar with the common pile floor coverings, such as Wilton, velvet, Chenille, Axminster, and Brussels. Classify the distinguishing characteristics of each.

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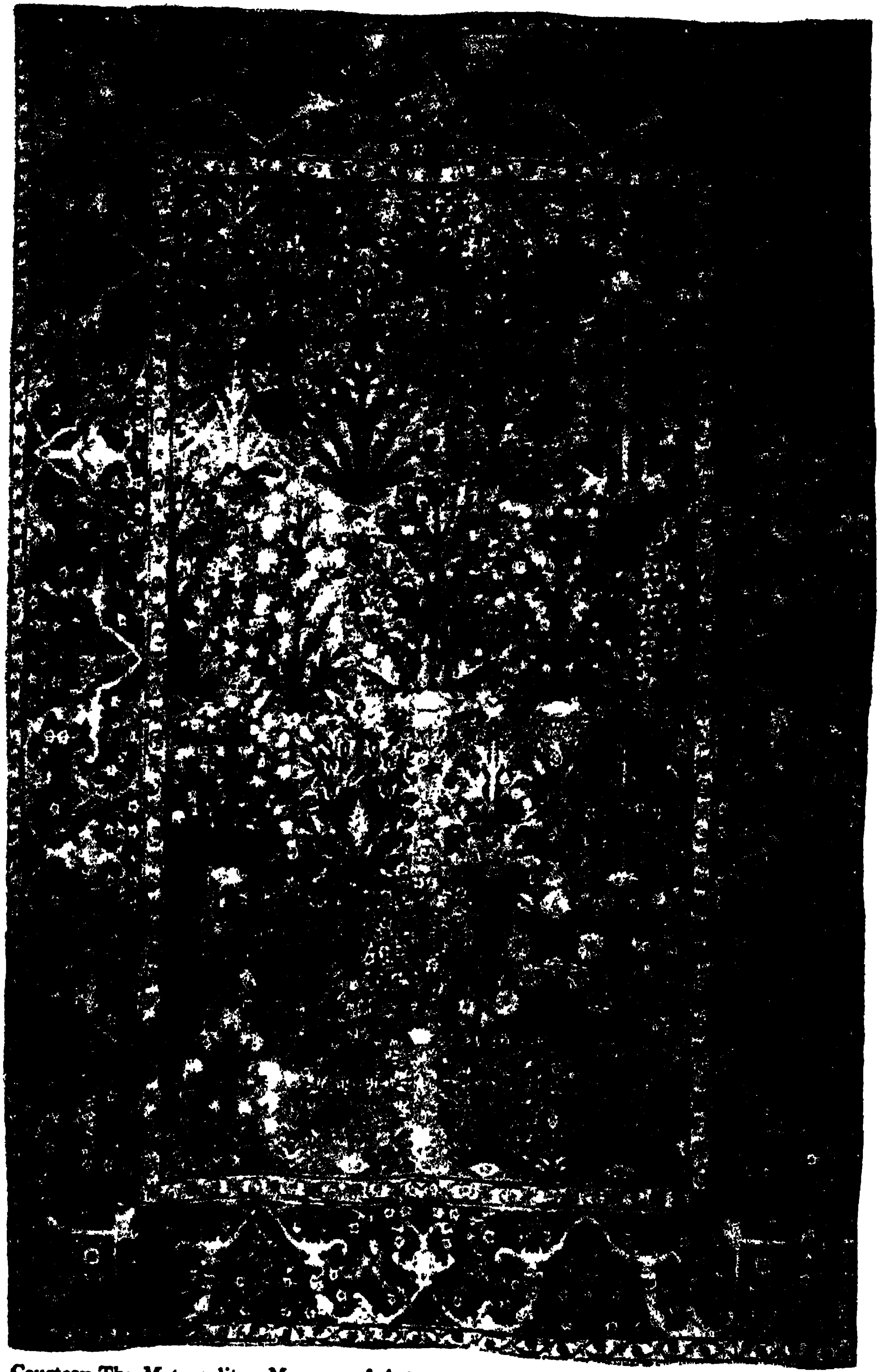
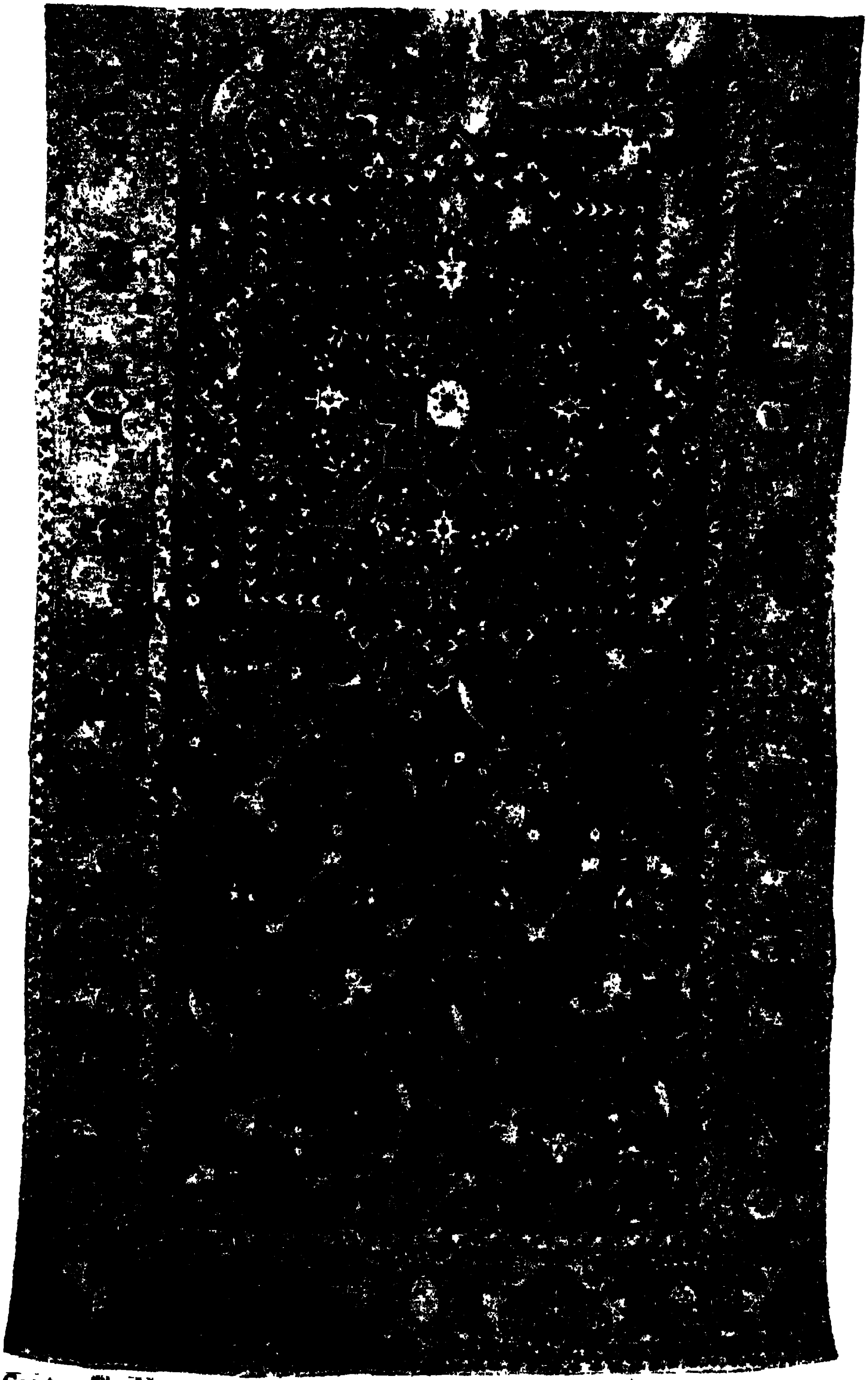
[1] Sherrill Whiton, *Elements of Interior Decoration*, p. 411. J. B. Lippincott Co., Chicago, 1937.



Courtesy The Metropolitan Museum of Art

Persian rug of the sixteenth century. This is the tree design, probably Kerman.



Courtesy The Metropolitan Museum of Art

Persian rug of the late fifteenth century. It is known as a medallion carpet.

2. At local prices, what would be the cost for covering a floor in a room 12 ft. x 20 ft. with a medium grade in each of the floor coverings listed above?
3. What would it cost to cover this floor adequately with (a) hooked rugs, (b) Navajo rugs, (c) braided rugs? State size and cost per unit.

References

Blackburn, Burr, and Dodge, Bernice, *Floor Coverings.* Better Buymanship, Household Finance Corporation, Chicago, 1943.

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APPENDIX

BUILDING AND LOAN AMORTIZATION

THE building and loan associations of the country lend funds for home buying and home building on a repayment basis. When the direct-reduction plan of reducing the debt is used, part of each payment is used for interest and part is used for payment on the principal. It is often thought that the interest portion is much larger than it actually is. The average proportion of the monthly payment actually taken as interest is shown by the following table containing figures in use by building and loan associations throughout the country.

AMORTIZATION TABLES[1]

Table showing how a $1,000 loan at 6 per cent interest is retired in 11 years and 7 months by monthly payments of $10 each:

Month	Outstanding Principal During Month	Monthly Payment	Applied to Interest	Applied to Principal	Principal Due After Installment Payment
First	$1,000.00	$10.00	$5.00	$5.00	$995.00
Second	995.00	10.00	4.98	5.02	989.98
Third	989.98	10.00	4.95	5.05	984.93
Fourth	984.93	10.00	4.93	5.07	979.86
Fifth	979.86	10.00	4.90	5.10	974.76
Sixth	974.76	10.00	4.88	5.12	969.64
Seventh	969.64	10.00	4.85	5.15	964.49
Eighth	964.49	10.00	4.83	5.17	959.32
Ninth	959.32	10.00	4.80	5.20	954.12
Tenth	954.12	10.00	4.77	5.23	948.89
Eleventh	948.89	10.00	4.75	5.25	943.64
Twelfth	943.64	10.00	4.72	5.28	938.36

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[1] John M. Gries and Thomas M. Curran, *Present Home Financing Methods,* p. 17. U. S. Department of Commerce, Bureau of Standards, Division of Building and Housing, BH 12, 1928.

Year	Total of Monthly Payments	Applied to Interest	Applied to Principal	Principal Due at End of Year
First	$120.00	$58.36	$61.62	$938.36
Second	120.00	54.56	65.44	872.92
Third	120.00	50.55	69.45	803.47
Fourth	120.00	46.25	73.75	729.72
Fifth	120.00	41.71	78.29	651.44
Sixth	120.00	36.89	83.11	568.33
Seventh	120.00	31.76	88.44	480.09
Eighth	120.00	26.32	93.68	386.41
Ninth	120.00	20.52	99.48	286.93
Tenth	120.00	14.40	105.60	181.33
Eleventh	120.00	7.89	112.11	69.22
Twelfth (7 months)	70.00	1.44	68.56	.66 *

* Principal due at end of 7 months.
Total interest paid during loan period, $390.65.

THE GOVERNMENT'S FHA RATING SYSTEM

Under an act passed by Congress, the Federal Housing Administration insures mortgages on houses. It makes examinations of the properties it insures and ranks them according to their promise of longevity. Such an examination seeks to determine not the current worth of a particular piece of property but the likelihood of the property retaining its worth over a period of years, and on this basis the mortgage is rated.

Several different factors enter into the rating of a property appraised for a mortgage, and each of them is given a value worked out on grids. Although these grids are used by experts who grade the mortgages according to their findings, they also have a use for the layman who is buying or building. If he wishes to make a wise choice, it would be extremely desirable to have an architect or contractor examine the property and check his general opinion by giving a definite rating. If his rating were below 85, caution should be exercised in going ahead. The following grids are used by the FHA inspectors:

GRID NO. 1. RATING OF BORROWER[1]

Feature		Reject	1	2	3	4	5	Rating
Character	Reputation		5	10	15	20	25	
	Attitude toward obligations		4	8	12	16	20	
Capacity	Ability to pay		6	12	18	24	30	
	Future prospects		3	6	9	12	15	
	Past record		2	4	6	8	10	
							Total Rating of Borrower	%

GRID NO. 2. RATING OF PROPERTY[2]

Physical Security Features		Reject	1	2	3	4	5	Rating
Durability	Structural Soundness		5	10	15	20	25	
	Resistance to elements		2	4	6	8	10	
	Resistance to use		1	2	3	4	5	
Function	Livability and functional plan		5	10	15	20	25	
	Natural light and ventilation		1	2	3	4	5	
	Mechanical and convenience equipment		2	4	6	8	10	
	Architectural attractiveness		4	8	12	16	20	
							Total Rating of Physical Security	%
Adjustment for nonconformity			12	9	6	3	0	%
							Total Rating of Property	%

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[1] *Underwriting Manual,* FHA Form No. 2049, Revised, Part I, pp. 227–229. Federal Housing Administration, Washington, D. C., 1936.

[2] *Ibid.,* Part II, p. 101.

GRID NO. 3. RATING OF LOCATION[1]

Feature	Reject	1	2	3	4	5	Rating
Relative economic stability							
Protection from adverse influences		4	5	12	16	20	
Adequacy of transportation		2	4	6	8	10	
Need for housing		1	2	3	4	5	
Appeal		1	2	3	4	5	
Sufficiency of utilities and conveniences		1	2	3	4	5	
Adequacy of civic, social, and commercial centers		1	2	3	4	5	
Level of taxes and special assessments		1	2	3	4	5	
Topography and special hazards		1	2	3	4	5	
						Total rating of location	%

GRID NO. 4. RATING OF MORTGAGE PATTERN[2]

Feature	Reject	1	2	3	4	5	Rating
Ratio of loan to value. . . %		6	9	12	16	20	
Ratio of debt service to rental value. . . . . %		2	4	6	8	10	
Ratio of useful building life to life of mortgage. . . . %		1	2	3	4	5	
Lowest category rating		10	15	20	25	30	
Intermediate category rating		4	8	12	16	20	
Highest category rating		3	6	9	12	15	
						Total rating of mortgage pattern	

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[1] *Ibid.*, Part II, 201.

[2] *Ibid.*, Part II, 401–402.

INDEX

Absorption-type refrigeration, 579, 583
Abstract of title, meaning of, 238
Accident prevention in the home, 82–99
Aged, housing for, 118–123
Air-conditioning equipment, 472–486
Aluminum, 607
American Gas Association, 563
American Standard Approval Requirements, 585
Amortization, 257, 270
Amortization tables, 693–694
Apartment, characteristics of desirable city, 206–214
Appliance cords, standards for choosing, 523–526
Architecture, style of, 161–179
Asphalt tiling, for floor covering, 443
  for work surface, 450
Axminster rugs, 682, 686–687

Baking utensils, 429–432
Bathrooms, safety in, 89
  activities of bathing and grooming, 16
  duplex, 54
  effect of private bath on health, 70
  lighting in, 505
Bathtubs, choosing of, 465
  waste fittings for, 461–462
Battleship linoleum, 442
Beaters, choosing of, 422–423, 546–547
Bedrooms adequate in space and arrangements, 9, 12, 16, 48, 56–58, 88
Bedsprings, 673
Better homes of America, 305
Birch, as a furniture wood, 660
Bone china, 636
Borrower, grid used for rating of, 695–696
Brass goods, types and choice of, 459–462
British thermal unit, 561
Broiling ovens, 554
Budgets for furniture, 260, 264
Building codes, 284

Canned food, storage space for, 402
Cape Cod style of architecture, 165
Carpets and rugs, 680–692
Cement floors, 445
Centrifugal dryers, 610
Ceramic tiling, for floor covering, 444
  for work surface, 450
Children, housing provisions for, 99–118
Circuit breaker, 521
Circuits, electric, 520–521
City planning, 144–160
Cleaning equipment, choice of use of, 593–602
Cleaning procedures, 587–604
Closet, clothes, space requirements, 402–404
Clothes basket cart, 344
Clothing, storage space for, 402–404
Coffee makers, essentials in making coffee, 512
  care of, 546
  drip, 543
  percolator, 544
  pot, 542
  vacuum-type, 543
Coffee pot, 542
Colonial style of architecture, 164
Comfort corner in kitchen, 198
Commercial laundering, cost of, 612

Community development and home location, 144–160
Conference on home building and home ownership, 305
Cooking and serving center, 355
Cooking utensils, choosing of, 424–427
Cost of building estimated, 273–285
Creole style of architecture, 169
Cul-de-sac loop pattern for subdivision layout, 155
Current, alternating, 527
Curtains, cleaning of, 595

Decalcomania, 639
Decorations on china, 638–641
Deed, 242–245
Design of the house, choosing exterior, 161
Dining rooms adequate in space and arrangement, 16, 45–47
Dinnerware, 633–645
Dinnerware and glassware, choice of, 630–649
Drip coffee maker, 543
Dutch Colonial style of architecture, 165
Dwelling, unit, defined, 5, 125
  apartment house, 133, 206–214
  detached, 126, 141
  efficiency apartments, 211
  garden apartment, 135
  multiple-family, 133
  row, 131
  slums, 136
  three-decker walk-up, 134
  tower apartment, 135
  two-family, 129–130

Efficient work centers and adequate storage space, 314–435
Electric bills, method of computing, 528–531
Electric cooking appliances, construction and use of, 537–548
Electric ranges, 556–557
Electric roasters, 560
Electric wiring, home, 513–533
Electrical current, types of, 527
Electrical heating elements, care of, 556–557
English style of architecture, 171
Engraving, 639, 656
Equipment, air conditioning, 472–486
  arrangement of kitchen, 347–365
  choosing of, for food preparation and service centers, 410–435
  fundamental, for the house, 436–533
  laundry, 604–628
    arrangement of, 365–381
  plumbing, 455–472
  using electricity and gas, 534–628
Equipment for ironing, 615–628
Equipment for washing clothes, 604–615
Estimation of cost of building, 273–285
Extension cords, electric, 523
  appliance, 523
  care of, 526
  flexible, 524
  heater, 524
  labels for, 526
  size of wire for, 525

Family activities, bathing and grooming, 16
  chart of, 20
  circulation, 17
  complexity of, 14
  design in terms of, 13, 23
  eating, 16
  entertainment, 15
  history of, 15–17
  laundering, 16
  play of children, 15
  preparing food, 16
  pursuing hobbies, 16
  relaxation and leisure time living, 15
  requiring installed equipment, 19
  requiring privacy, 17
  requiring separation, 18
  scheduling of space required, 18
  sleeping, 16

Family activities (*Continued*)
  storing, 17
  studying, 16
  taking place at the same time, 18
Family, character of American, 3–6
Family income, 215–217
Family income and home furnishings, 259–264
Family life, effect of housing on, 7–12
Family requirements for housing, 24–61
Farm home, characteristics of a good, 190–206
Farm Security Administration, 310
Fatigue and posture of the worker, 334–337, 342
Faucets, types and choice of, 459–460
Federal Farm Loan Act, 304
Federal Home Loan Bank Act, 271, 306
Federal Housing Administration,
  its purpose, 306
  relationship between the house and its land, 186
  use in financing home ownership, 271–272, 310
Federal Land Banks, 304, 306
Federal Public Housing Authority, 309
Federal Reserve Act, 304
Financing agencies for home buyer, 266–273
Financing a home, means of, 266–273
Finishes for wall, floor, and work surface, 437–454
Fires, causes and prevention of, 90, 93
Fire-stopping, 94–95
Fixtures, plumbing, materials used for, 462–465, 468
Flatware, 649
Floor coverings, asphalt tiling, 443
  Axminster, 682, 686–687
  Brussels, 682, 686–687
  cement floors, 445
  ceramic tiling, 444
  Chenille, 682, 687
  craft-type, 683
  felt-base, 443
  linoleum, 441–442
  magnesite composition, 445
Floor coverings (*Continued*)
  merits of different materials and finishes used for, 450
  Oriental, 682, 687–689
  quarry-tile, 444
  rubber, 444
  terrazzo, 445
  Velvet, 682, 686–687
Floor coverings, choice of, 680–692
Fluorescent light, 493–494, 501
Flush tank, 460–461
Food choppers, 421
Food mixers, electric, 546–547
Food preparation, choosing small equipment for, 410–435
Foot-candle, 487
Forced hot-water heating system, 481
Forced warm-air heating system, 481
Frame design, ranges, 549
French Colonial style of architecture, 165
Fundamental equipment for the house, 436–533
  definition of, 436
Furnishings, home, budgets for, 260–264
  relating expenditures for, to income, 260–264
Furniture, suitable and satisfying, 658–680
  bedspring, 673
  construction of, 667
  finish, 666
  grades of, 669–670, 674–675
  importance of wood, 659
  mattresses, 676
  pillows, 677
  solid wood, 664
  upholstered, 669, 671
  veneered, 665
Furniture woods, 659–667
Fuses, purpose of, 521
  cartridge, 522
  changing a, 522
  plug, 522

Gas, general information concerning, 561–562
Gas ranges, 562–565

Gasoline as a fuel, 565
Gasoline iron, 620
Georgian style of architecture, 169
Glare, causes of, 497
Glass, 295, 451
Glassware, 645–648
Government, role of in housing, 301–313
Gravity hot-water heating system, 481
Gravity warm-air heating system, 481
Gridiron pattern for subdivision layouts, 154

Hair mattresses, 676
Hardwoods, 438, 659
Health, family affected by, 61–82
  chemical toxins, 71
  crowding, 62–66
  dumbbell shaft, 68
  effect of housing on, 61–82
  heat, 78
  household pests, 71
  lack of privacy, 65
  lot overcrowding, 67–68
  nervous impairment, 71
  private bath, 70
  room density, 63
  slums, 62, 78
  solar house, 75
  spread of communicable diseases, 67–69, 71
  substandard conditions and, 61–73
  sunlight, 73–78
  windows, 73
Heating elements, 558–559
  concentric rings, 558
  open coil, 558
  tubular, 558
Heating systems, 481–483
Height of working equipment, correct, 337–338
Hollow ware, 649, 655
Home accidents, prevention of, 82–99
Home, amount safely spent for ownership of, 251–266
  attaining attractive setting for, 180–189
Home (*Continued*)
  characteristics of good city apartment, 206–214
  characteristics of good rural, 190–206
  correct height of equipment in, 337–338
  estimating cost of building a, 273–285
  financing agencies available to buyer of, 266–273
  planning efficient kitchen for, 347–365
  planning efficient laundry area for, 365–381
  productive activities in, 314–326
  provisions for sewing and mending in, 381–386
Home buyers, source of funds for, 266–273
Home furnishings, budgets for, 261–262
Home furnishings, family income and, 259–264
Home furnishings, standards of quality for, 629–692
Home grounds, plan of, 180–189
Home laundering, analysis of, 374–375
  cost of, 611–612
  equipment and methods for, 604–615
Homemaking activities, disliked, 324
  time spent in, 318–322
Home owner, legal information for, 234–257
Home ownership, amount safely spent for, 251–266
Home ownership versus renting, 227–234
Home Owners' Loan Corporation, 271, 306
Horsepower, 528
House, air conditioning equipment for, 472–486
  attaining attractive setting for, 180–189
  choosing exterior design of, 161–179
  choosing the site for, 144–160

House (*Continued*)
  desirable procedures for cleaning, 587–604
  essential parts of, 286, 288–289
  floor coverings for, 441–445, 682–689
  floor finishes for, 446
  fundamental equipment for, 436–533
  heating systems for, 481–482
  illumination for, 486–513
  kinds of activity areas in, 13–18
  plumbing for, 455–472
  sewerage system of, 469–470
  standards for judging structure of, 286–301
  structural materials used in, 290–293
  window space in, 73
House and its environment, the, 121–213
House plan, judging desirability of, 21–61
  relation of, to lot, 180–189
Houses, amount safely spent for, 251–266
  building, 273–285
  condition of, 138
  kinds of, 125–144
  means of reducing cost of building, 276, 278–282
  multiple-family, 133
  one-family, 126, 141
  prefabrication of, 282
  row, 131
  shortage of, 140–143
  two-family, 129–130
Houses, kinds of, 125–144
Housing, effect of, on family life, 7–12
  on health of family, 61–82
Housing needs and family income, 215–313
Housing needs of family, 7–12
Housing provision for children, 99–118

Illumination for the house, choosing adequate, 486–513
Illumination for house (*Continued*)
  distribution of light by fixtures, 491
    diffuse, 492
    direct and semidirect, 491
    panel, 492
    semi-indirect and indirect, 492
    spot, 492
  glare, 497–499
  importance of, 486
  level of intensity, 487
  recommendations for lighting various rooms, 502–508
    bathroom, 505
    bedroom, 504–505
    dining room, 503–504
    entrance, halls, and closets, 507–508
    kitchen, 506–507
    living room, 502–503
  recommended levels of intensity, 489
  reflection factors, 488, 499
  seeing spots in a room, 511
  spectral quality of light, 499
Insulation house construction, 479
  in range ovens, 552–553
  in refrigerators, 576
Irish Bellek china, 636
Ironer, pressboard type, 622, 625
  roll, 622
Italian style of architecture, 174

Jasper china, 636

Kerosene as a fuel, 565
  long chimney burner, 567
  short chimney burner, 568
Kilowatt hour, 529
Kitchen,
  arrangement in various shapes, 357
  arrangement of equipment in, 347–365
  planning an efficient, 347–365
  size of, 359, 360–361
Kitchen floors, walls, and work counters, materials for, 450

Kitchen, planning an efficient, 347–365
Kitchen sinks, choosing of, 463
Knives, 413–419

Land contract, as lending agency, 269
Landscaping the home grounds, 180–189
Laundering equipment and methods, 604–615
Laundry area, location of, 366, 368
  planning an efficient, 365–381
Laundry equipment, arrangement of, 373, 377
Laundry, planning an efficient, 365–381
Lavatories, choosing of, 462–463, 468
  waste fittings for, 461–462
Lease, 249–250
Legal information for home owner, 234–251
  abstract of title, 238
  agreement to purchase, 236–237
  assessments, 238
  building permits, 234
  contracts and agreements, 234–247
  deed, 242–243
  judgment, 238
  lease, 249–250
  legal transfer of property, 234–235
  lien, 238–239
  mortgage, 238–240, 242
  obligations to city, county, state, 234, 239
  ownership rights of husband and wife, 234
  passing the title, 241, 246
  quit-claim deed, 243
  real-estate broker, 235
  renting, 234, 248
  rights of husband and wife, 243
  specifications, 247–248
  taxes, 238–239, 241
  widow's dower, 246
Legal rights of husband and wife in real estate ownership, 243
Legal transfer of property, 234–235
Liens, 238–239
Life insurance companies, as lending agency, 266
Light, distribution of, 491–492
  symbols for outlets, 516
Lighting for various rooms, recommendations for, 502–508
Lighting intensities, recommended, 489
Lighting intensity, a factor of comfort, 487
  recommended, 489
Linens, household, storage space for, 407
Linoleums, construction, 444
  care of, 445
  for work surfaces, 450
  grades, 442
  kinds, 442
Living rooms adequate in space and arrangement, 11, 34, 41, 44
Location of city apartment, 208, 211
Location of farm home, 191
Location of home, choosing the, 144–160
L-shaped arrangement of apartments, 209
L-shaped kitchen, arrangement in, 357

Magnesite composition, 445
Marbled linoleum, 441–442
Materials for kitchen floors, walls, and work counters, 446, 450
Mattress, 676
Mechanical refrigerator, 579
  absorption, 579, 583
  compression, 579–581
  defrosting, 582
  evaporator, 582
Medicines, storage space for, 408
Mending and sewing, provisions for, 381–386
Meter, electric, 528
  method of reading, 528
Meter, method of reading and computing charges, 528
Mixing center, 351–354
Modern style of architecture, 176–177

Mortgage companies, as lending agency, 267
Mortgages, 256–270
Motors on washers, 613
  effect of current on, 527
  on refrigerators, 579

National Housing Act, 271, 308, 312

One-pipe steam heating system, 482
One-wall kitchen, arrangement in, 357
Ovens, construction of, 551
  broiling, 554
  circulation of heat, 553
  cooking, 553
  doors, 552
  insulation, 553
  rack supports, 552
  vents, 551
Overcrowding, room and lot, 62–68

Panel or radiant heating system, 483
Pennsylvania Colonial style of architecture, 166–167
Percolator, 544
Pillows, 677
Pitchers, guides for choosing, 643–644
Planning center, 351–354
Planting of the home grounds, 180–189
Plated silverware, grades of, 654
Plugs, standards for choosing, 523–526
Plumbing equipment, 455–472
Porcelain enamel for plumbing fixtures, 462–463
  for work surfaces, 448
  on ranges, 551
  on washers, 607
Prefabrication, 282
Pressboard type ironer, 625
Pressure saucepans, 433
Prevention of accidents in the home, 82–99
Private investors, as lending agency, 268
Productive activities in the home, 314–326
Public Works Administration, 307

Quarry tile, 444

Ranges chosen, 549–571
  arrangement of heating units, 550
  British thermal unit, 561
  coal ranges, 569
  conservation of fuel, 556
  conveniences on, 555
  electric heating units, 556–557
  frame construction, 551
  frame design, 549
  gas burners, 562
  gasoline as a fuel, 565
  kerosene as a fuel, 567
  ovens, 551
  standards for CP range, 564–565
  thermal well, 556
Ranges, standards for choosing, 549–557
Rating, of borrower, grid used for, 695
  of location, grid used for, 696
  of mortgage pattern, grid used for, 696
  of property, grid used for, 695
Refrigeration needs, household, 571–587
  care of refrigerator, 584
  conveniences on refrigerator, 578
  definition of, 572
  door of refrigerator, 577
  frame of refrigerator, 576
  ice as a refrigerant, 578
  importance of, 571
  insulation of refrigerator, 576
  linings of refrigerator, 576
  mechanical refrigerator, 579–584
  proper temperatures for storing foods, 574–575
  purpose of, 572
  size of refrigerator, 577
  storage of frozen foods, 584–585

Refrigerator, 576–584
Refrigerators, ice, 578
  insulation in, 576
  mechanical, 579–584
  standards for choosing, 571–587
Relative humidity and comfort, 475
Renting and home ownership, factors for consideration in, 227–234
Requirements of efficient work center, 326–347
  efforts in work, 331–343
  equipment required, 330
  fatigue, 337
  objectives sought, 327
  posture, 334–336, 342
  provision for sitting, 339–340, 342
  steps in accomplishing, 328
  toe room, 345
  work center defined, 326
  work surface, 334
  working heights, 337–338
Rinsing tubs, 608–609
Rooms in house, classification of, 26–27
Rubber flooring, 444
Rural home, characteristics of a good, 190–206
  business of farm family, 190, 201
  conveniences, 196–197
  dining area, 202
  expenditures for, 203–204
  extent of farms, 190
  farm house, 193
  farmstead site, 191
  food preparation, 198–199
  objectives sought for, 190
  rest area, 202
  room arrangement, 195
  service areas, 194–195, 199–200
  set-back, 193
  social area, 201

Safety of the family, 82–99
  accidental deaths in house, 82
  agencies sponsoring, 96–97
  bathroom, 89
  bedroom, 88
  burns, 86–89
Safety of the family (*Continued*)
  cuts, 87
  falls, 83, 87–89, 91–92
  fire-resistant construction, 94–95
  fires, 90, 93
  halls, 91
  housekeeping, 92
  kitchen, 86
  living room, 87
  location of accidents, 84
  mechanical and personal causes, 83
  objects involved, 85
  poisoning, 89
  porch, 92–93
  stairs, 91
Savings and loan association amortization, 693–694
Savings and loan associations, as lending agency, 268
Savings bank, as lending agency, 267
Service area adequate in space and arrangement, 185
Setting for the house, attaining an attractive, 180–206
  activity areas, 184
  approach to house, 184
  beauty of, 183
  Chinese home, 180
  garage, 184
  plantings, 187, 189
  pleasure area, 185
  privacy in, 181, 187
  relation of house to land, 183, 186–187
  service area, 185
Sewerage system of the house, 469–470
Sewing and mending, provisions for, 381–386
Sewing room, planning an efficient, 381–386
  general conditions facilitating, 382
  location of equipment, 383
  location of room, 381, 383–385
  provisions for, 382
Sharpening tools, 417–418
Shelter, family spend for, 218–227
  effect of inflation or deflation on, 222
  occupational differences in, 225

Shelter *(Continued)*
  proportions of incomes spent, 223, 258
  regional differences in, 224
  relation to other expenditures, 219, 221–222
Shredders, 420
Silverware chosen, 649–658
Silverware, grades of, 651, 654–655
  standard finishes for, 655
  standards for choosing, 649–658
Site for the farm house, 191, 193
Site for the house, choosing the, 144–160
Sleeping quarters adequate in space and arrangement, 9, 12, 48–52, 56–58
Slicers, 420
Slums, types of dwelling, 136
  government demolishes, 302
Social or public areas in house, 11, 26–27, 34, 41, 44
Southern style of architecture, 167–168
Space heaters, 481
Spanish style of architecture, 171, 176
Spoons, 420
Stainless steel, 447, 463, 607
Standards for choosing,
  coffee-making devices, 542–544
  dinnerware, 633–645
  furniture, 659–675
  irons and ironers, 615–628
  ranges, 549–571
  refrigerators, 571–587
  silverware, 649–658
  toasters, 537–540
  vacuum cleaners, 597–602
  washers, 604–615
Standards for choosing silverware, 649–658
  back stamps on sterling silver, 652
  care of, 657
  coin silver, 653
  composition of, 650–651
  finishes on silverware, 655
  flatware, 619
  grades of silver-plated hollow ware, 655
  hollow ware, 649
Standards for choosing silverware *(Continued)*
  manufacturers, 650–651
  new patterns, 651
  ornamentation on, 656
  quality of silver-plated silver, 654
  service for 8, 656
  service for 12, 657
  silver-plated ware, 653
  sterling silverware, 651
  type of base metal blank, 654
  weight of silver-plated silver, 654
  weight of sterling silverware, 651
Standards for choosing suitable and satisfying furniture, 658–680
Standards for CP range, 561–565
  broilers, 564
  general, 561
  optional features, 565
  ovens, 564
  top burners, 561
Standards for judging the structure of the house, 286–301
  definition of parts, 286, 288–289
  frame construction, 289
  glass, 295
  masonry, 289, 293–294
  properties of materials, 290–293
  rats, 295
  steel, 294
  termites, 297
Standards of quality for certain home furnishings, 629–692
Steam iron, 620
Storage, importance of, 387
  rules for planning, 394–395, 399
Storage needs, for serving center, analysis of, 351–354
Storage of frozen foods, 584–585
Storage space, adequate and desirable, 387–410
  location in kitchen, 396, 398
Storage space, planning provisions for, 387–410
  analysis of needs, 389–390
  complexity of problem, 387
  current supplies, 396, 399
  determination of space required, 396, 398–404, 406–407
  furniture used as, 392

- Storage space (*Continued*)
  - garage, 392
  - height, 404
  - importance of, 387
  - purpose of, 391
  - successful methods, 394–395, 399
  - surplus supplies, 400
- Storage spaces for, canned food, 402
  - cleaning equipment and supplies, 407
  - household linens, 407
  - kitchen, 396, 398
  - medicines, 408
  - sleeping and dressing areas, 51, 404–406

- Taxes
  - affecting costs of home ownership, 252
  - affecting legal rights to home ownership, 238–239, 241
- Temperatures, comfortable, 78, 473–474
  - accepted, in refrigerator, 574–575
  - controls, 483
  - factors in control of, 474
- Termites, 297
- Terrazzo, 445
- Thermal wells, 556
- Thermostat, electrical appliances, 527
  - effect of current on, 528
  - for heating systems, 483
- Toasters 537–540
  - oven-type, 539
  - reversible, 538
  - sandwich, 539
  - uses for, 537
- Trust companies, as lending agency, 267
- T-shaped arrangement of apartments, 209
- Two-pipe steam heating system, 482
- Two-wall kitchen, 357

- Underwriters' Laboratories, 523, 585
- United States Housing Corporation, 304, 308
- Upholstered furniture, 669–675
  - burlap, 671
- Upholstered furniture (*Continued*)
  - coils, 671
  - grades of, 674–675
  - stuffing, 671
  - unexposed surfaces, 669
  - webbing, 669
- U-shaped kitchen, arrangements in, 357

- Vacuum cleaners, 592–602
  - care of, 602
  - motor-driven cylinder, 597
  - straight suction, 597
  - tank, 599
- Vacuum-type coffee maker, 543
- Vents, from ovens, 551

- Waffle iron, 540–541
- Wall finishes, kinds of, 449, 451–453
- Wallpaper, as a wall finish, 451–453
- Water closet, 466
- Water for laundering, 378
- Water supply, adequate and safe, 455–457
- Wattages, fixed electrical equipment, 514
  - portable electrical equipment, 515
- Waxing of floors, 445
- Wedgewood, 636
- Wire, gauges of, 519–520
- Woods, for flooring, 438–441
  - cleaning, 594
  - for making furniture, 659–669
- Work center, cooking and serving, 355
  - food preparation, 351
  - providing efficient, 326–347
  - sewing, 381–386
- Working surface heights, correct, 337–340, 342
- Wringers, 609

- Zoning, in community development, 150
  - to reduce fire hazards, 304
- Zoning laws, 150, 304